Capital Area
Bus Transit Development Plan

cat

2012

CAPITAL AREA TRANSIT

SHORT RANGE TRANSIT PLAN

INITIAL DRAFT REPORT

March 2012

Prepared for
City of Raleigh/Capital Area Transit

Prepared by
HDR Engineering, Inc. of the Carolinas

HDR

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1 Background & Introduction

The City of Raleigh/Capital Area Transit (CAT) *2012 Short Range Transit Plan* presents recommendations to implement the initial phases of the long-range transit service and capital improvements developed for Wake County.

In September 2010, the Capital Area Metropolitan Planning Organization (CAMPO), and the City of Raleigh/CAT, engaged HDR Engineering, Inc. of the Carolinas (HDR) and its subconsultants to prepare the *2040 Capital Area Bus Transit Development Plan* for service in the CAMPO jurisdiction as a long-range complement to separate rail studies being undertaken by Triangle Transit. Separately, the City of Raleigh/CAT included the development of more detailed implementation plans for local bus service within Raleigh. This report outlines short-range findings and recommendations.

1.1 Study Overview

This study involved the preparation of a short range bus transit plan for the city of Raleigh in anticipation of significant population and employment growth. The *Raleigh 2030 Comprehensive Plan* projects that the city population will grow from 404,000 in 2010 to almost 600,000 by 2030, almost a 50 percent increase. The entire capital area jurisdiction is projected to grow in population from 880,500 in 2005 to 1,952,000 in 2035, a 122 percent increase. How an additional 200,000 Raleigh residents and over 1 million new Wake County residents will continue to be able to travel efficiently is a major concern and challenge.

The *2012 CAT Short Range Transit Plan* calls for the development of an enhanced bus system that complements an expansion of bus service throughout the Triangle and the introduction of a potential long-range rail transit system. Enhancing the existing bus service system will allow the city to meet future economic and environmental sustainability initiatives: including improving quality of life, reducing environmental impacts, and ensuring the long-term economic vitality for the region. It complements the Raleigh Five Strategic Themes of Customer Service, Neighborhood Quality, Capital Projects, Environmental Initiatives, and Growth. Addressing these initiatives by investing in the future bus service system will improve mobility choices, increase regional connectivity between major activity and employment centers, create new jobs, and reduce the impacts of traffic congestion.

The planning horizon used for the *2012 CAT Short Range Transit Plan* is a three- to five-year horizon. Essentially, it represents the bus transit changes that are recommended to occur in Raleigh prior to the introduction of commuter rail service in the region. The horizon timeline is flexible, reflecting the current uncertainty over the available funding for transit. While numerous improvements can be made within the existing resources being spent on transit, the full implementation of these changes will require additional sources of funding. One potential source, but not the only one, is a half-cent sales tax

dedicated to transit; a source recently approved in Durham County and currently under consideration for Wake County.

1.1.1 Relationship to Rail Studies

Triangle Transit (TTA) is conducting an Alternatives Analysis (AA) for future rail investment in the entire Triangle region, encompassing Wake, Durham, and Orange Counties. The AA is examining multiple rail corridors both within individual counties and across county borders. Both commuter rail (using existing/expanded freight tracks) and light rail transit (LRT) technologies are being considered[1].

The AA is focused on specific rail corridors, and does not include an analysis of the overall transportation needs in the three counties. Each county is developing its own bus service plans that consider transit connections to the rail corridors and service beyond the corridors throughout the individual counties. At the conclusion of the study process, the rail plans and bus plans will be merged into a comprehensive transit plan for the region. It is anticipated that this comprehensive plan will be taken to the voters in each county to solicit their approval on implementing a half-cent sales tax dedicated to funding the transit program within each county. Each county must conduct its own referendum; Durham County voters approved the sales tax in 2011, and Wake County voters may be asked to vote on a similar tax later in 2012.

The *2012 CAT Short Range Transit Plan* is based upon the assumption that additional funding to expand service is available, through the sales tax or some other source, but the planned rail improvements have not yet been implemented. Essentially the *2012 CAT Short Range Transit Plan* details the immediate bus service changes that need to be in place to support an expanded transit program.

1.1.2 Associated Studies

As part of the long-range transit planning, two Technical Memoranda were prepared and are included in the **Appendix**. Technical Memorandum #1 presents the results of a rider survey conducted on the CAT, CTran, Triangle Transit, and Wolfline system. Highlights for the CAT system are provided in Section 2.4 of this *2012 CAT Short Range Transit Plan*. Technical Memorandum #2 presents the results of the boarding & alighting counts on the CAT and CTran systems for a weekday and a Saturday. The CAT highlights are given in Section 2.3.

1.1.3 Components of the CAT Short Range Transit Plan

The *2012 CAT Short Range Transit Plan* is intended to serve as a guide in developing a transit vision, outlining existing findings, and implementing recommendations. The plan presents a series of transit service and capital improvement recommendations aimed at accomplishing these objectives.

[1] For current information on the AA study, refer to the project website, http://www.ourtransitfuture.com/.

The main components of the transit development plan include:

- An examination of existing routes and plans
- Considerations of existing and future demographics, land use, and travel patterns
- Input from citizens and stakeholders on existing and proposed future service expansions
- Recommendations for new service, enhancements made to existing service, and capital facility improvements based on the results from previous components
- A phased financial forecasting plan identifying operating and capital costs associated with implementing the recommendations of the transit plan

1.1.4 A "Living Document"

The *2012 CAT Short Range Transit Plan* is subject to some changes. While the initial phases, which are possible with no increase in funding, are relatively set, the changes proposed for later years may be modified as they move to the implementation phase. Population and employment projections may not materialize as anticipated, or funding may not be available when expected, so the plans may need to be adjusted. Transit demand may also increase faster than projected. Current forecasting foresees the return of $4.00 per gallon gasoline in 2012, with some forecasts calling for $5.00 per gallon gasoline. Should these higher prices come about, transit demand is likely to be much higher than anticipated, which could require a more aggressive expansion than is called for in this *2012 CAT Short Range Transit Plan*.

1.2 Study Area

The study area for the *2012 CAT Short Range Transit Plan* is the city limits of Raleigh. **Exhibit 1-1** shows the CAT service (in orange) in relation to the other services provided within the entire CAMPO region. Also shown are the existing bus services provided by C-Tran (within Cary), TTA (throughout the Triangle), and Wolfline (at NC State).

1.3 Study Team

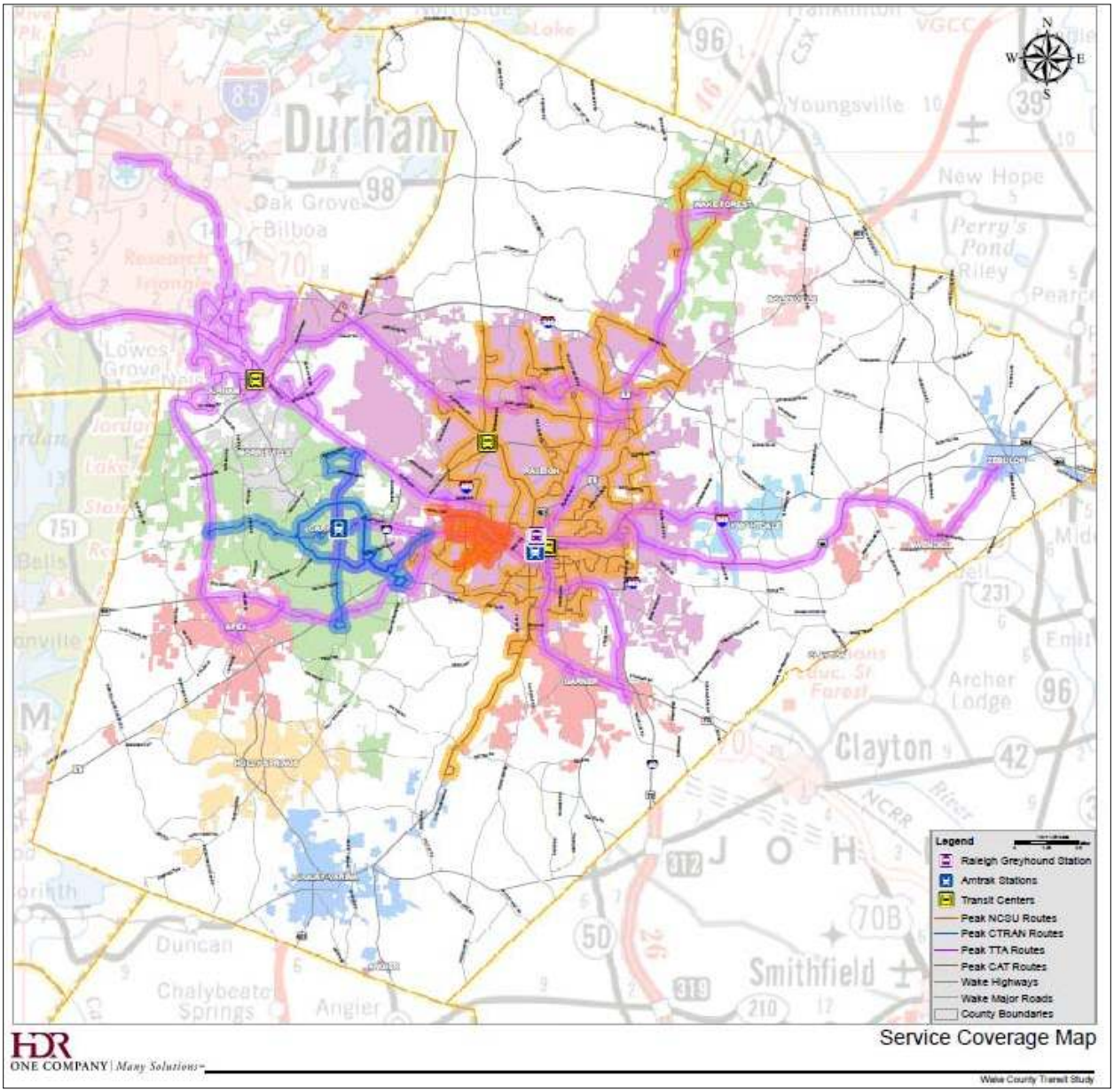
To ensure the goals and recommendations of the *2012 CAT Short Range Transit Plan* reflect the interests and considerations of all persons in Raleigh, considerable effort was made to incorporate the input of public officials, representatives of key civic organizations and public agencies, and the general public. An assembled project team consisting of a study steering committee, local transit and transportation partners, the Raleigh Transit Authority Board, and HDR consultants guided and monitored study progress. Additional public input is scheduled before these changes are finalized.

1.3.1 Core Study Steering Committee

The core study steering committee consisted of CAT staff and the consultant team

David Eatman	City of Raleigh/CAT – PM	Michael Ousdahl	HDR
Carmalee Scarpitti	City of Raleigh/CAT	Mike Surasky	HDR
Aaron Hair	City of Raleigh/CAT	Jessica Tisdale	HDR
Robert Bush	HDR Project Manager	Brett Wallace	HDR
Marcus Arnold	HDR	Kevin Hall	Planning Communities
Claire Brinkley	HDR	Andy Mundew	AJM Consulting

Exhibit 1-1
Existing Wake County Transit Service Coverage



2 Study Area Characteristics

Detailed existing demographic, land use, and travel pattern analyses were prepared to describe the market for transit in the study area. This analysis generated data regarding ridership propensity, transit-supportive density, and travel patterns to help recommend areas for new or improved transit service. This chapter provides a summary of this analysis that was conducted for the *2040 Capital Area Bus Transit Development Plan* and the results of a complete passenger boarding and alighting count, ridership survey, and public involvement process survey, which together provide additional insights regarding service preferences and propensity to ride new or improved transit services. For a more detailed discussion, the reader is referred to the long range plan.

2.1 Ridership Propensity

Transit ridership propensity measures the inclination or likelihood of using public transit. A higher propensity toward an action means a greater likelihood to do the action. Propensity can be quantified such that someone with a propensity of "2" is twice as likely to do something, such as take transit, as someone with a propensity of "1".

HDR examined the 2000 U.S. Census data on a Census Block Group basis to identify those areas with characteristics most likely to support transit service[2]. To identify the transit propensity for each of the block groups, 10 demographic indicators were considered. Each indicator was carefully selected based upon industry research regarding the potential users of transit. The background analysis is contained in Transit Cooperative Research Program[3] *Report 28: Transit Markets of the Future, The Challenges of Change.* The specific factors examined in order of their propensity included:

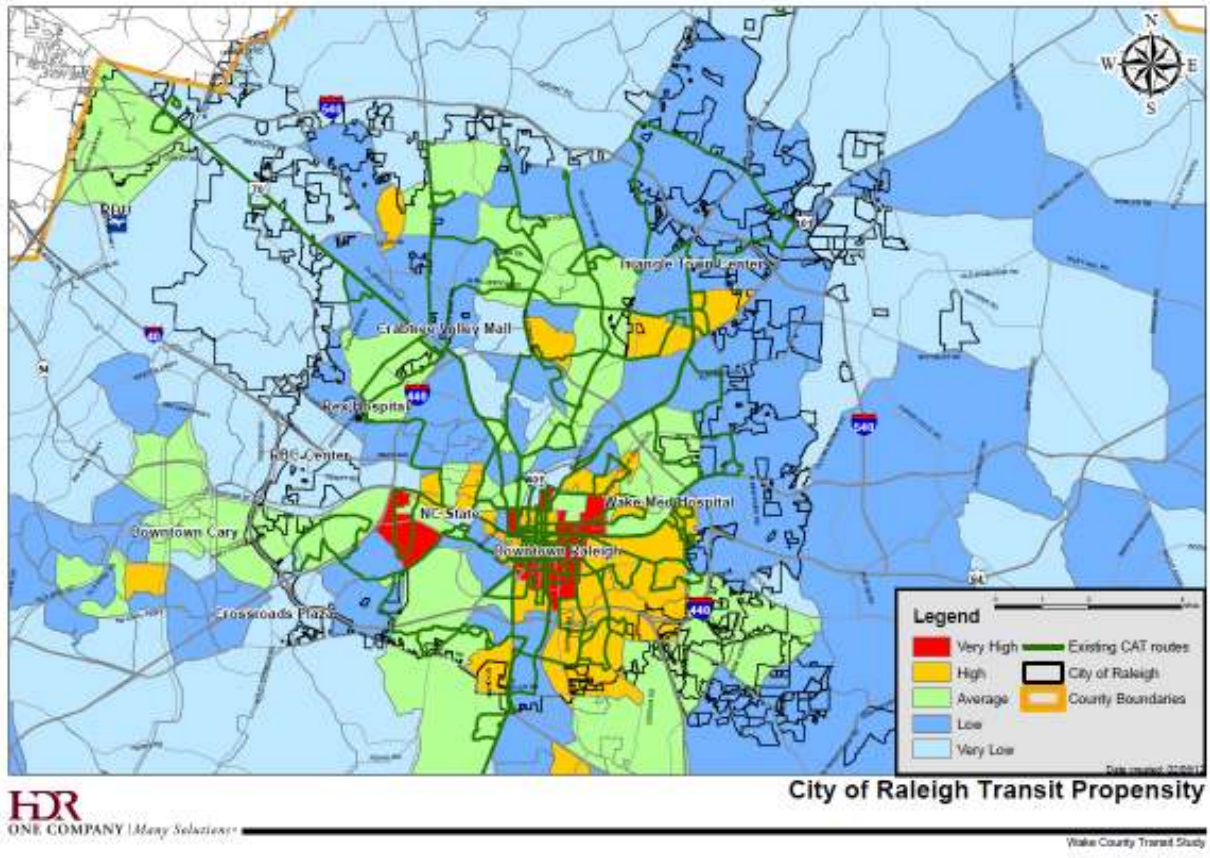
- Population density
- Percentage of households without cars
- Percentage of persons with mobility limitations
- Percentage of persons with work disabilities
- Percentage of persons who were not White, non-Hispanic
- Percentage of recent (< 10 years) immigrants
- Percentage of low-income (<$20,000) households
- Percentage of female persons
- Percentage of persons in the workforce age 65 or older
- Percentage of persons in the workforce age 30 or younger

[2] At the time of this study, necessary information from the 2010 Census was not available.
[3] The Transit Cooperative Research Program is part of the Transportation Research Board of the National Research Council. Its extensive publications are available free at http://www.tcrponline.org.

An index for each of these factors was developed in order to determine the relative rank of the Block Group compared with the highest ranked Block Group for that factor. These indexes were then weighted to develop a Composite Score for each Block Group. The composite scores were statistically grouped into five categories, from "very low" to "very high" based upon their relationship to the scores of the other Block Groups.

Exhibit 2-1 shows the relative ranking of the Block Groups in Raleigh for transit propensity. As the exhibit illustrates in red and yellow, the concentration of residents with the highest propensity to use transit service is in the immediate area of the City of Raleigh central business district (CBD); eastern portions of the City of Raleigh (especially along the Poole Rd. and Martin Luther King Jr. Blvd. corridors); southern portions of the City of Raleigh (especially along the Rock Quarry Rd. and Garner Rd. corridors); and in the vicinity of the NCSU campus (especially along the Western Blvd. corridor).

Exhibit 2-1
Ridership Propensity



As a caution, this information is based upon the 2000 Census; the 2010 Census information has not yet been released in sufficient detail to provide the same level of analysis. It is unlikely that the predominant area of transit propensity has changed much, although the dramatic population growth in Wake County between 2000 and 2010 is likely to have increased the propensity in all urban block groups.

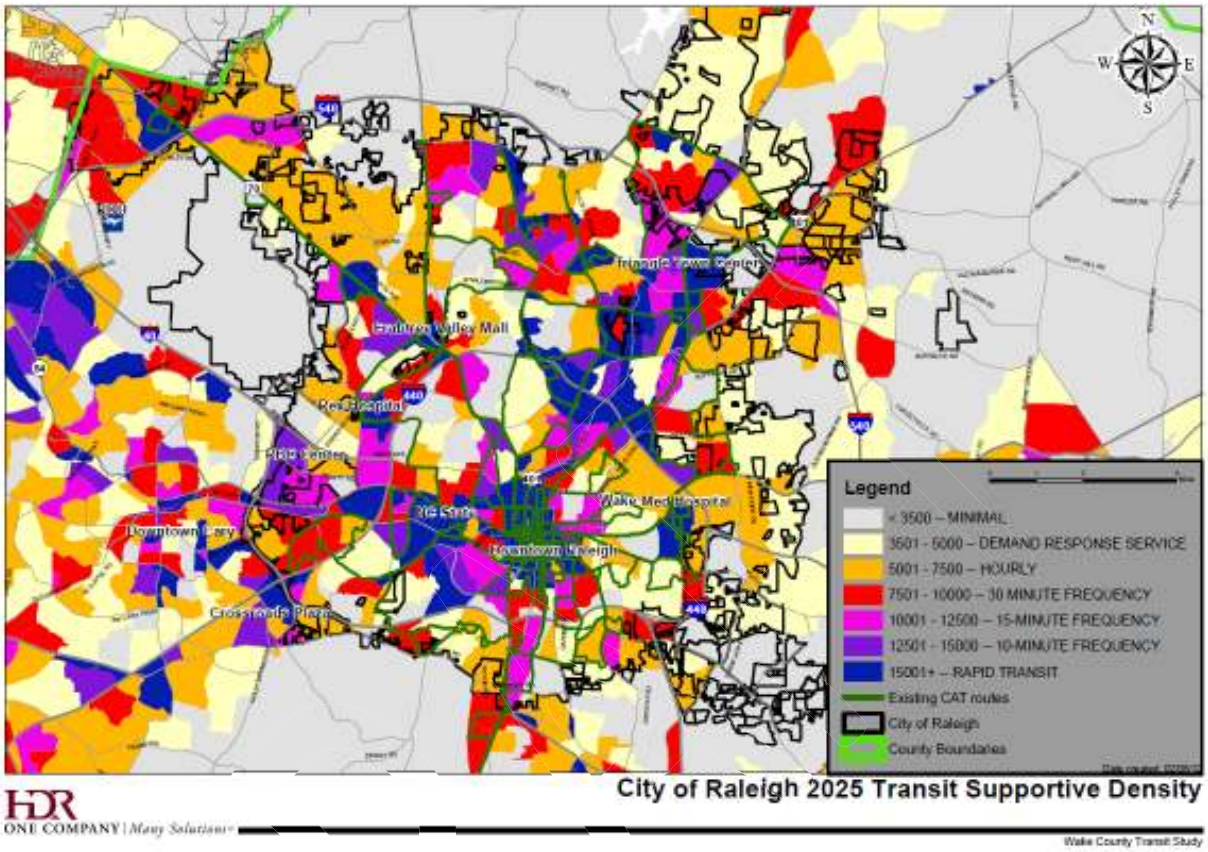
2.2 Transit Supportive Density

Transit industry research provides guidance on whether an area is "transit supportive". This analysis is described in the *TCRP Report 100: The Transit Capacity and Quality of Service Manual.* "Transit supportive" areas are determined by the density of the population and employment within a given area such as a "Traffic Analysis Zone (TAZ). The higher the density, the more transit service that can be supported. According to the TCRP report, a density of at least three housing units per gross acre (about eight people), or a density of at least four jobs per acre are necessary to support hourly bus service. An equivalent combination of housing and jobs would have the same effect. Overall, the number of jobs counts twice as much as the population when calculating transit-supportive density.

The data for the transit supportive density analysis comes from the Triangle Regional Model. This model provides data on a TAZ basis for both population and employment. Based upon the above ratios, the transit supportive density can be calculated. **Exhibit 2-2** illustrates the transit supportive density results for Raleigh in 2025. The scale of equivalent population/square mile used in the exhibit should be viewed as a general guide and not an absolute requirement for the different service levels.

Several TAZs possess sufficient density under this analysis to support the most intensive capital projects and frequent transit services. Notable concentrations include areas in the immediate vicinity of the City of Raleigh CBD, areas surrounding the NCSU campus, and northern portions of the City of Raleigh (especially along the Six Forks Rd. corridor, Falls of Neuse Rd. corridor, Atlantic Ave. corridor, and the Capital Blvd. corridor). These locations are indicated by the blue shading on the map.

Exhibit 2-2
2025 Transit Supportive Density



2.3 Passenger Boarding and Alighting Counts

To better understand existing transit ridership trends, a complete boarding and alighting count was conducted for CAT using on-board counter personnel or "checkers". The boarding and alighting count was conducted for all existing CAT routes in September 2010. During the count, the checkers recorded all boardings and alightings for each stop on a trip-by-trip basis. The following sections provide an overview of the ridership findings of the check. More detail can be found in a separate Technical Memorandum.

2.3.1 CAT Daily Ridership

Daily ridership, defined as total boardings, for the CAT system was about 18,700. Alighting information was also recorded to identify active destination locations. **Exhibit 2-3** shows the route-by-route results for the total count. The top five routes in terms of daily riders are:

1. Route 15: Wake Med
2. Route 1: Capital
3. Route 7: South Saunders
4. Route 4: Rex Hospital
5. Route 2: Falls of Neuse

Generally, the lowest ridership routes are all CAT early morning and late evening services. The ridership levels encompass not only the lower usage per trip, but also the shorter span of service for these routes as compared with their daytime counterparts. Overall, CAT boardings increased by 3,435 or 24% over the previous boarding and alighting count completed in 2008.

Exhibit 2-3
Weekday CAT Ridership

Route	Route	Ons	Offs	Total	Rank
1	Capital	1994	2015	4009	2
2	Falls of Neuse	1078	1070	2148	5
3	Glascock	306	304	610	22
4	Rex Hospital	1087	1094	2181	4
5	Biltmore Hills	639	629	1268	10
6	Crabtree	755	743	1498	8
7	South Saunders	1211	1204	2415	3
7C	Carolina Pines	388	388	776	18
8	Northclift	521	522	1043	13
8C	Sawmill Connector	180	180	360	25
10	Longview	468	447	915	16
11	Avent Ferry	1061	1070	2131	6
11C	Buck Jones Connector	304	304	608	23
12	Method	939	937	1876	7
13	Chavis Heights Loop	327	333	660	21
15	Wake Med	2208	2222	4430	1
15C	Trawick Connector	709	710	1419	9
16	Oberlin	610	612	1222	11
18	Worthdale	607	607	1214	12
19	Apollo Heights	507	507	1014	14
21	Caraleigh	475	469	944	15
22	State Street	434	427	861	17
23C	Millbrook Connector	304	304	608	23
24C	North Crosstown	364	364	728	20
25C	Triangle Town Center	371	371	742	19
26C	Early East	8	7	15	38
27	Southeast	25	25	50	36
28	Southwest	14	14	28	37
29	North Night Connector	45	45	90	34
30	Northeast	46	46	92	33

Route	Route	Ons	Offs	Total	Rank
32	Sanderford Road	151	145	296	26
33	Glenwood-Creedmoor	30	30	60	35
35	Poole Road	96	97	193	28
36	Garner Station	130	137	267	27
37	North Hills	54	63	117	31
38	Blue Ridge	87	91	178	29
39	Cameron Village	73	73	146	30
70	Brier Creek Express	51	51	102	32
SYSTEMWIDE		**18,657**	**18,657**	**37,314**	

Source: 2010 CAT Boarding and Alighting Count

2.3.2 Estimated Individual Riders

Traditionally, the transit industry has counted passenger boardings as "ridership." A boarding occurs every time a rider gets on a bus, and is the easiest and most accurate count of riders. Boardings are also known as "unlinked" trips. For riders that transfer between buses to complete a one-way trip, that rider would count as two boardings (one on each bus route, but this would be classified as one "linked" or one-way trip. If the rider made the trip in the morning and returned in the afternoon, that individual rider would be counted as four boardings or two linked trips.

From the rider survey data, an estimate can be made of the number of individuals that use CAT service. **Exhibit 2-4** shows this calculation for a the typical day. The unlinked trips are divided by the number of transfers to convert to linked trips. Individuals are estimated by dividing the linked trips by two, under the assumption that everyone makes a round trip on transit. This probably underestimates the number of individuals since some will not take transit in both the morning and afternoon, but others may make more than one trip during the day, such as to take transit to lunch. Without specific data, these effects are assumed to cancel one another out. The results show that one-way (linked) trips are about two-thirds of the boardings (unlinked trips), and individual riders are about one-third of the daily boardings.

Exhibit 2-4
Estimated Daily Individuals

Transfers	Unlinked Trips	Linked Trips	Individuals
0	5,829	5,829	2,915
1	7,412	3,706	1,853
2	1,912	637	319
Total	**15,153**	**10,172**	**5,086**
		67%	**34%**

Source: 2010 CAT Rider Survey; note missing values are not shown.

The other calculation that needs to be made to estimate individuals that use transit is to adjust for riders who do not ride every day. Some people will only take transit a few times a week or month. Since on

any given day, these individuals will be different, the number of individual riders must be increased to reflect that there are many more individuals who ride only one day per week than are picked up on a single day survey. **Exhibit 2-5** shows this adjustment. Note that this table's totals are slightly different from the tables in Exhibit 2-4 since they have been adjusted to account for missing data. As shown, an estimated 13, 156 individuals use CAT services every month.

Exhibit 2-5
Estimated Monthly Individuals

Rider Freq	Unlinked	Daily Individuals	Adj Factor	Monthly Individuals
6 to 7 days a week	7,177	2,409	1.085	2,614
5 days a week	4,740	1,591	1.4	2,227
3 to 4 days a week	2,472	830	2.04	1,693
1 to 2 days a week	1,526	512	5.25	2,688
Once or twice a month	473	159	14	2,221
Less than once a month	182	61	28	1,713
Total	**16,569**	**5,562**		**13,156**

Source: 2010 CAT Rider Survey.

2.3.3 Major Activity Locations

From the stop level ridership, the major activity locations for the system can be identified. The top location, not surprisingly, is the Moore Square Station Transit Mall in downtown Raleigh. Moore Square is the focal point for most of CAT's routes. There were 5,902 boardings and 4,704 alightings at Moore Square, which combined are 28% of all trip ends (boardings & alightings) in the CAT system. Note that this activity level does not include the R-Line, which was not counted, nor does it include the Triangle Transit routes that serve downtown Raleigh.


Moore Square

In Downtown Raleigh as a whole, excluding Moore Square, there were 450 boardings and 1,558 alightings, or 5% of all trip ends. The imbalance between the boardings and alightings at Moore Square and the rest of downtown, and their imbalance in opposite directions, indicates that many people will get off their bus at their destination in downtown, but will walk to Moore Square to board their bus for their return trip. For all of downtown, total transit activity would also need to consider the R-Line and Triangle Transit routes. During FY 2010, the R-Line had about 650 daily boardings (1300 trip ends) all of which would be in downtown, and the Triangle Transit routes serving downtown had about 2,000 daily boardings. Assuming half of the TTA boardings occurred in downtown (potentially a generous assumption), another 1,000 daily boardings (or 2,000 trip ends) would have occurred in downtown.

This information allows a very broad estimation of the potential capture rate of downtown employment. According to the Raleigh *2030 Comprehensive Plan*, downtown has about 37,500 employees, including both private and governmental workers. Assuming about 1,500 CAT riders are destined to downtown, reflected by the number of alightings away from Moore Square, and assuming that they are all destined to downtown for work, then about 1,500 individuals commute via CAT. Another 1,000 individuals commute via Triangle Transit for a total of about 2,500 individuals. This calculation does not include the R-Line riders, who are likely transferring or not using transit for their work commute. Given these assumptions, approximately 6.7% (2,500/37,500) of the downtown workforce commutes via transit.

Aside from downtown, four broad areas had more than 1,000 trip ends on CAT. These areas are Wake Med, Triangle Town Center, Crabtree Valley Mall, and NC State. Ridership at these locations represent boardings/alightings at stops in the general vicinity, so will include riders that are transferring or that are destined to nearby locations and not necessarily the hospital, malls, or university. **Exhibit 2-4** shows the major transit locations for CAT, including Moore Square and downtown. Collectively, these five activity centers plus Moore Square account for 50% of all trip ends in the CAT system. Note that this table only reflects CAT riders; Triangle Transit riders and Wolfline riders are in addition to these ridership levels.

Exhibit 2-6
Major CAT Transit Activity Centers

Activity Center	Boardings	Alightings	Total Trip Ends	Percent of System
Moore Square	5,902	4,704	10,606	28%
Wake Med	1,242	1,132	2,374	6%
Raleigh CBD (outside Moore Square)	450	1,558	2,008	5%
Triangle Town Center	613	711	1,324	4%
Crabtree Valley Mall	597	646	1,243	3%
NC State University	501	522	1,023	3%

Source: 2010 CAT Boarding and Alighting Count

2.3.4 Load Factors

The maximum passenger load for each bus trip was calculated. This "max load" is used to ensure that the buses are properly sized for the passenger loads, and to identify routes where more or less frequent service could be warranted.

Trips were identified where the number of passengers exceeded 42 passengers, the weighted average number of seats on CAT buses. While standees are tolerated during peak hours, an excessive number of standees should be avoided, and generally every passenger should have a seat during off-peak hours.

Results indicate that only 10 trips (out of 1,169) had weekday max loads in excess of 42 passengers, with the largest load being 63 passengers. The routes that did have max loads in excess of 42 passengers

were Route 15 Wake Med (6 trips); Route 1 Capital (1 trip); Route 2 Falls of Neuse (1 trip); Route 7 South Saunders (1 trip); and Route 11 Avent Ferry (1 trip).

2.4 Rider On-board Surveys

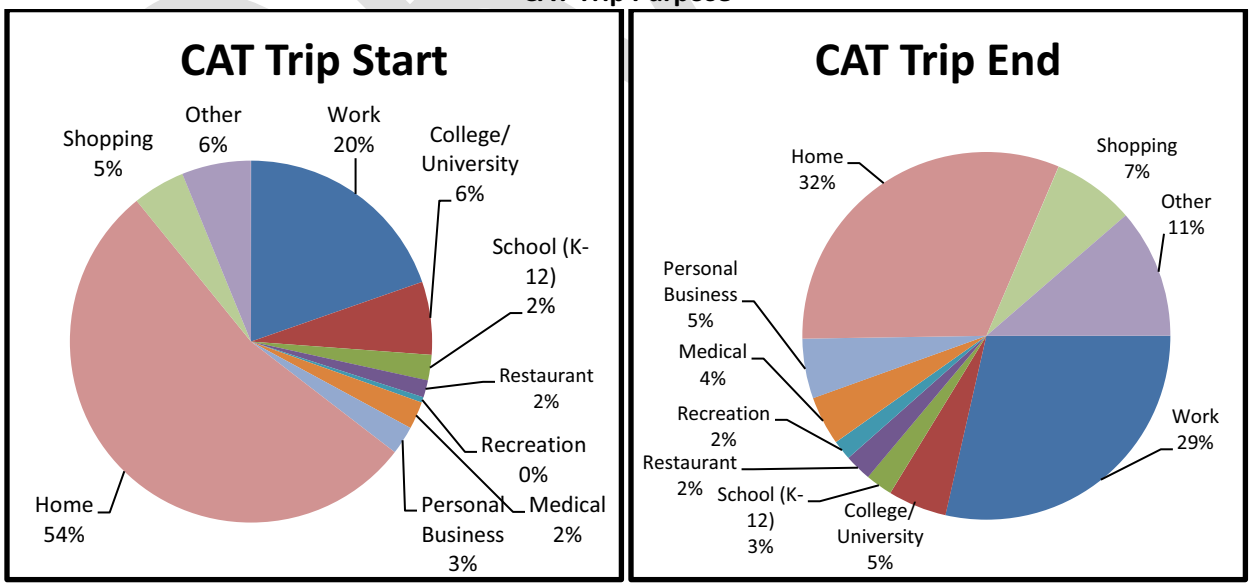
In order to gain a better understanding of current transit users within the region, an on-board ridership survey was administered in October 2010. Survey forms were available in English and Spanish versions. The survey asked questions regarding riders' trip characteristics, ridership habits, demographic information, and recommendations for improvements. The rider surveys are described in detail in a separate Technical Memorandum prepared as part of the overall study. Highlights are given below.

The CAT rider survey sampled routes over an average weekday period. Overall, a total of 2,131 total responses were received. This sample size is accurate at the 90% confidence level, plus or minus 1.7% for systemwide statistics. The results presented below reflect the weighting of responses based on the number of responses received by each route.

2.4.1 CAT Trip Characteristics

When asked about the purpose of their trip, phrased as "Where did you come from before you got on this bus?" and "Where are you going now?" the majority of riders (54%) said their origin was from home, while just under half (46%) were coming from a different location. On the destination end, the plurality of riders (32%) was returning home. **Exhibit 2-7** shows the results.

Exhibit 2-7
CAT Trip Purpose



Source: 2010 Rider Survey

Besides "home," the major origin and destination was for "work" comprising 20% of the origins and 29% of the destinations. "Shopping" was the next highest with 5% of the origins and 7% of the destinations followed by "college/university" with 6% of the origins and 5% of the destinations.

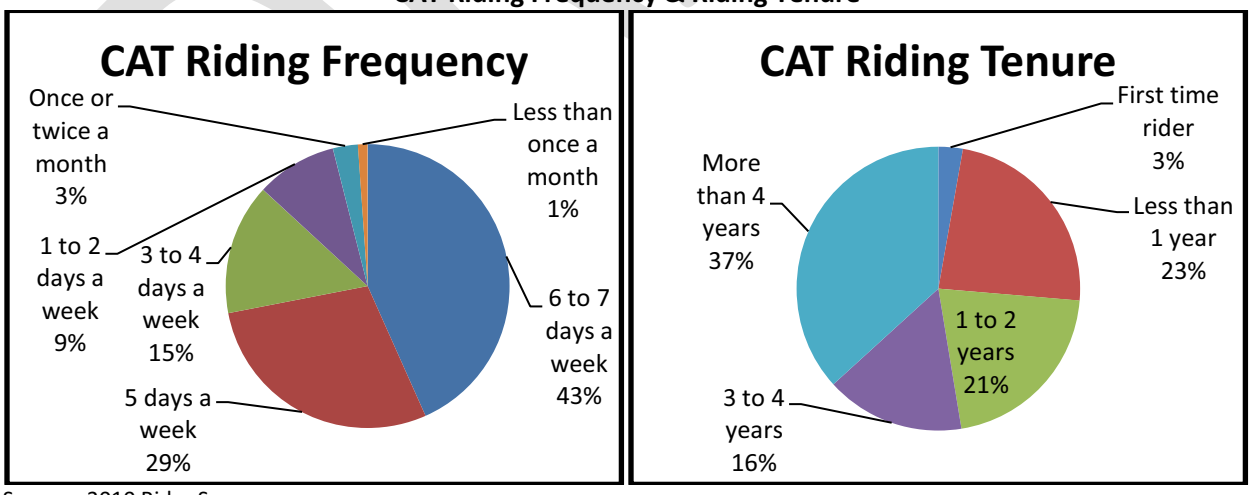
When excluding "home" as a trip purpose, CAT had a plurality of trips for work at 45%. CAT also showed a large percentage of college/university related trips at 10%. Another significant trip purpose was for shopping on CAT at around 10% of the trips. These findings convey the benefits of having a transit system in place by providing mobility for residents to engage in productive activities that benefit the overall economy of the Triangle.

2.4.2 CAT Rider System Use

Riders were asked how frequently they use CAT's bus service. As illustrated in **Exhibit 2-8**, most CAT riders ride the bus six to seven days per week. These results provide evidence of riders' reliance on the CAT system as their primary source of travel. These findings were demonstrated in the complete boarding and alighting counts, which indicated Saturday ridership (11,659 boardings) capturing approximately 62% of weekday ridership (18,657 boardings).

Riders were also asked how long they have been riding CAT. The majority of riders, roughly 53%, have been riding CAT for at least three years. Approximately a quarter of riders were relatively new to the system riding CAT for less than a year. In order for CAT to continue to grow its system, it is vital that efforts are made to hold on to these new riders. A general rule-of-thumb is that it costs five times as much to replace a customer as it does to keep an existing customer.

Exhibit 2-8
CAT Riding Frequency & Riding Tenure



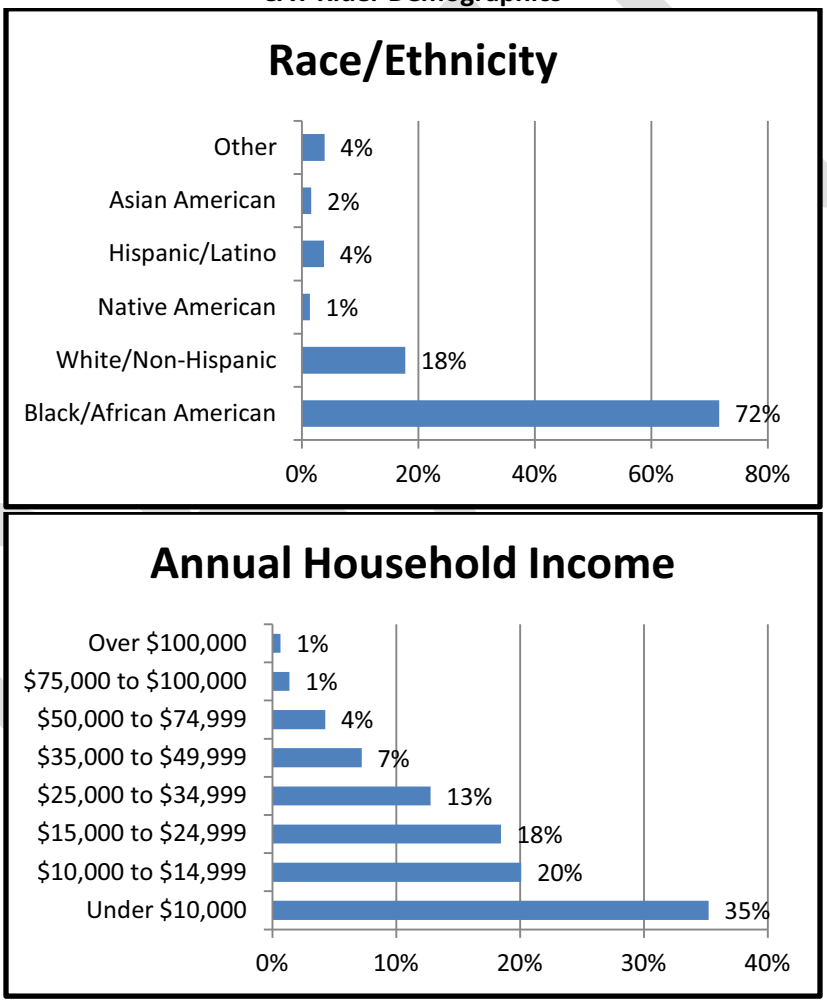
Source: 2010 Rider Survey

2.4.3 CAT Rider Demographics

To gain an understanding of who uses the bus, riders were asked questions regarding their race/ethnicity and household income, and reasons for using the bus. The demographic findings are shown in **Exhibit 2-9**.

The race/ethnicity of CAT riders is nearly three-quarters Black/African American. As with most transit systems, the household income level for the majority of users is under $15,000 annually. This contrasts to the share of higher income households, which accounted for just 6% of respondents earning over $50,000.

Exhibit 2-9
CAT Rider Demographics

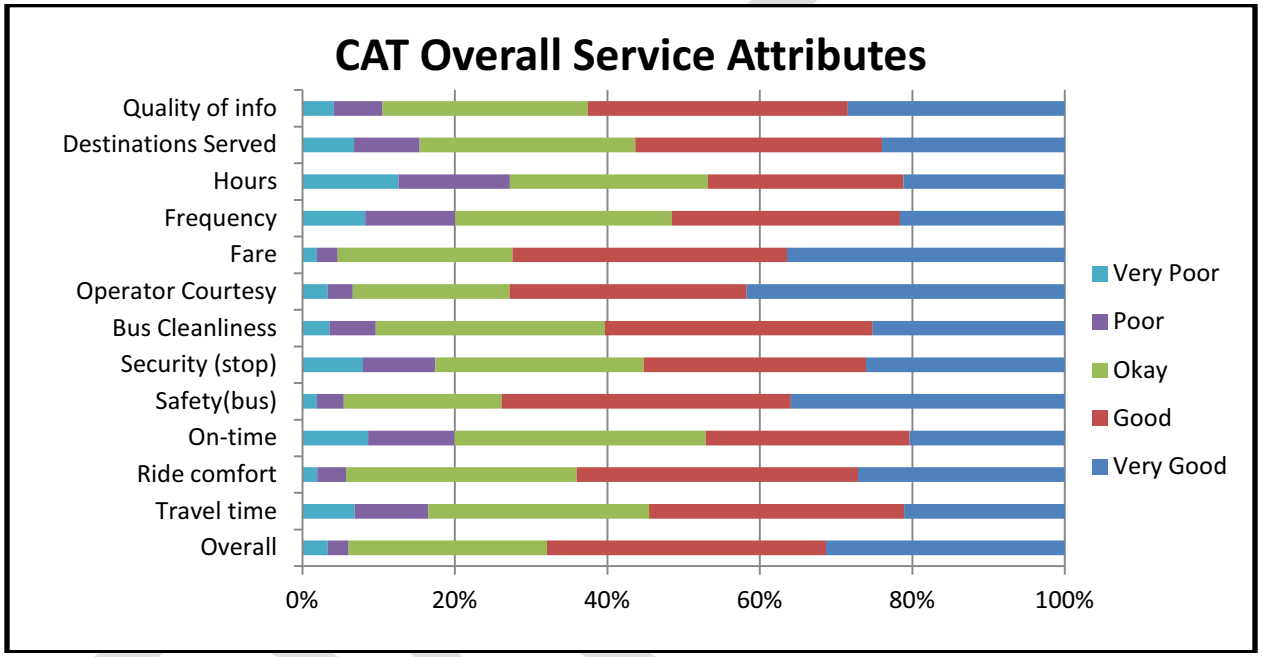


Source: 2010 Rider Survey

2.4.4 CAT Recommendations for Improvements

Riders were asked for their rating of the CAT system as a whole and for several distinct aspects. The results are shown in **Exhibit 2-10**. Overall, riders were satisfied with CAT's bus services. A large majority of riders, approximately 68%, said existing overall service was either good or very good. A small percentage of riders, just over 5%, felt existing service was either poor or very poor. On a scale of 1 to 5 with 1 being very poor and 5 being very good, the overall ranking is 3.90, "Good".

Exhibit 2-10
CAT Service Attribute Evaluation



Source: 2010 Rider Survey

On a weighted basis, the top scoring attributes, all with a composite score better than 4.0 are:

- Operator courtesy
- Safety on the bus
- Fare

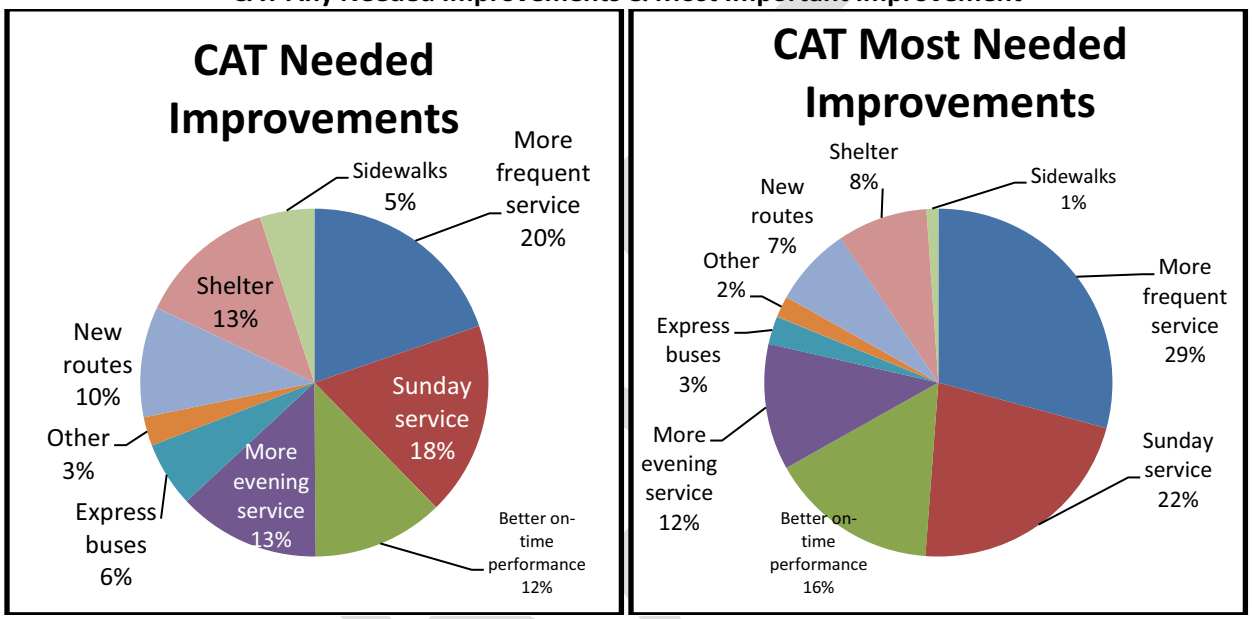
The lowest scoring attributes, all with a composite score below 3.5 are:

- Hours of service
- On-time performance
- Frequency

Even riders with generally positive views of CAT's service many had suggestions on how to improve the service. The responses are shown in **Exhibit 2-11.**

Given unlimited choices, riders evenly distributed their suggestions for improvement among several service variables. More frequent service, Sunday service, more evening service, shelters, better on-time performance, and the desire for new routes all received at least 10% of the responses. Given only *one* choice, the desire for more frequent service, service on Sundays, and better on-time performance maintained their positions as the top three choices, but "more evening service" rose to be the fourth most needed improvement.

Exhibit 2-11
CAT Any Needed Improvements & Most Important Improvement



Source: 2010 Rider Survey

2.4.5 Choice Indicators

The rider survey asked two questions of riders to gain insights into why the riders used bus service instead of some other travel mode, and which travel mode they would take if bus service was not provided. The major reason for using the bus for CAT was because "The bus is my only option," selected by 59% of the riders. These riders are those typically considered as "transit dependent" but just as significant is that 41% could be considered as choice riders. The message is that far from the view of many in the general public, transit riders are not just those who have no other option; nearly 9% in fact use the bus to save money on their commuting costs.

A second question provides further insight into the impact of bus service. When asked how they would travel if no bus service was available, 38% would shift to a shared-ride mode, either riding with a friend or a taxi. Another 21% would shift to a non-motorized mode, either walking or bicycling, with 17% choosing to drive to work. Significantly, 24% of CAT riders would lose their mobility and would not make the trip.

2.5 Public Involvement

The general public was given a number of opportunities to provide input on desired service improvements as part of the planning outreach for the overall *2012 CAT Short Range Transit Plan*. These opportunities included:

- Joint workshops with Triangle Transit as part of their Alternatives Analysis meetings in September 2010 and March 2011;
- Stakeholder meetings at the Raleigh Urban Design Center in December 2010 and at Biltmore Hills Community Center in February 2011;
- Presentations to the Raleigh Transit Authority Board in December 2010, and March, May, and September 2011;
- Public meetings in June 2011 at the Walnut Creek Wetlands Center, Raleigh Urban Design Center, Triangle Town Center, and McKimmon Center, and
- Meetings with CAT bus operators in October 2010 and June 2011.

A separate memorandum provides details about specific comments. The general themes that emerged from all meetings were:

- Provide more frequent service
- Recommend focus on particular high density/specific service area
- Reduce travel time
- Improve connections and transfers
- Provide more local and commuter routes
- Expand bus amenities (shelters, benches)
- Extend service hours – weekends, later hours, holidays

Additional opportunities for public input will be held before this plan is finally adopted. These include presentations to the Raleigh Transit Authority Board, community input sessions at major transit locations, such as Moore Square, and presentations to specific community groups. Refer to the Transit Plan website,

http://www.raleighnc.gov/services/content/PWksTransit/Articles/ShortRangeTransitPlan.html,

for more details as they are developed.

3 Mobility Recommendations

In developing the recommendations for improved local bus service in Raleigh and throughout Wake County, several objectives were identified. The service changes should develop a comprehensive bus network within Wake County that:

- Enhances existing transit corridors
- Builds upon existing success
- Links population and employment centers with direct services
- Directs transit services to areas with projected growth
- Defines service levels that correspond with projected ridership
- Creates a framework of transit options that may be deployed quickly

Guidelines used in the development of the individual route proposals were to:

- Simplify routes for new riders
- Consolidate off-hour routes into peak routes
- Reduce large one-way loops
- Provide minimum basic service frequency and span of service; more as demand warrants
- Initiate or increase weekend and holiday services where warranted
- Identify major corridors for emphasis
- Adequately equip the fleet with new buses, including spares
- Construct capital improvements to support the expanded system, both on-street and off-street
- Complement the Triangle Transit rail system by connecting with it and not duplicating it

3.1 Service and Capital Concepts

Enhancements to transit service and capital facilities serve as the basis for the recommendations in the *2012 CAT Short Range Transit Plan*. The following listing describes the types of transit services and capital facilities that were determined to be appropriate for Raleigh.

1. Transit Service by Route Type
   A. Local routes
      a. CAT radial and crosstown service primarily operating on major thoroughfares with few deviations.
      b. Ideally anchored on both ends by major transit locations.

Local Bus

c. Located along major residential and employment corridors.
d. Primarily located in areas where the transit-supportive density (combination of population and employment) exceeds 7500 persons per square mile.


Commuter Bus

B. Commuter routes
   a. Express service provided by Triangle Transit primarily operating on highways focused on downtown, NC State, and Wake Med (the locations that charge for parking)
   b. These routes have higher fares and use over-the-road coaches
   c. As a Triangle Transit service, these routes were not developed further in the *2012 CAT Short Range Transit Plan*, but were included in the long-range *2040 Capital Area Bus Transit Development Plan*

C. Neighborhood circulator routes
   a. Routes can deviate off major thoroughfares.
   b. Includes "activity center specials" operating in concentrated areas such as downtown using distinctive buses, e.g. the R-Line

D. Weekend/holiday routes
   a. Provision of local and neighborhood circulator services given ridership targets are met.
   b. Saturday or Sunday levels of service provided on all major holidays.

E. Paratransit service
   a. ADA paratransit service for disabled individuals unable to access regular, fixed-route transit service.
   b. Costs included where ADA service boundaries increase


Neighborhood Transit Center

2. Capital facilities
   A. Transit Centers
      a. Location with three or more routes.
      b. May or may not include automobile parking facilities.
      c. Off-street facility with bus bays and boarding platforms, operator layover facilities (such as restrooms that may or may not include public access), and passenger amenities such as real-time bus arrival/departure times and bus shelters.
      d. Includes overhead shelter over platforms and bus loading areas.
   B. Transfer Points
      a. Similar to Transit Centers, but at a lower scale.

b. May be off-street location, or a series of shelters and pullout bays located on-street.
c. Does not include as many passenger amenities or operator restrooms.

C. Premium Transit Corridors
   a. Corridors designed for local service.
   b. Sidewalk coverage located along the corridor.
   c. Bus benches/shelters at all stops.

D. Streetside Amenities
   a. Benches/shelters at heavily used stops
   b. Additional sidewalks
   c. Special downtown shelters; bulb-outs; transit streets
   d. New bus stop signs

E. Support Facilities
   a. Buses
      i. Different buses for different service types
      ii. Spare buses included
      iii. Sufficient maintenance capacity exists at the new CAT maintenance facility on Poole Road
   b. ITS items
      i. Real time bus displays
      ii. Internet/smart phone applications
      iii. Mobile data terminals, automatic passenger counters


CBD Shelter

3.2 Service and Capital Design Guidelines

This section describes the general guidelines used to design the recommended bus service network and to decide where the different service types and capital facilities should be provided.

1. Transit service
   A. Local routes
      a. Decrease headways (the time interval between buses) on all local routes to no more than 30-minutes during weekday peak-periods and 60-minutes during all other times.
      b. Increase span-of-service on all local routes to at least 14 hours during weekdays.
      c. Targeted performance is 25 passengers/hour.
   B. Neighborhood circulator routes
      a. Decrease headways on all circulator routes to at most 30-minutes during weekday peak-periods and 60-minutes during all other times.
      b. Decrease headways on all "activity center special" (such as the R-Line) routes to no more than 10-minutes in both directions.

c. Increase span-of-service on all circulators to at least 14 hours during weekdays.
d. Targeted performance is 12 passengers/hour.

C. Weekend routes
a. Decrease headways on all weekend routes to no more than 60-minutes.
b. Increase span-of-service on all weekend routes to at least 12 hours.
c. Local weekend routes
i. Targeted performance is 20 passengers/hour Saturday and 15 passengers/hour Sunday.
ii. Existing Saturday service maintained if passengers/hour exceeds 15; Existing Sunday service maintained if passengers/hour exceeds 10.
d. Neighborhood circulator routes
i. Targeted performance is 10 passengers/hour Saturday and 8 passengers/hour Sunday.

2. Capital facilities
A. Transit centers
a. Provide operator layover facilities such as benches, vending machines, and restrooms.
b. Provide passenger amenities such as signage, lighting, benches, shelters, information displays, and sidewalks.
c. Space approximately 15 to 30 minutes apart (roughly 3 to 6 miles).
d. Locate approximately 5 to 10 miles from Downtown Raleigh.
B. Premium Transit Corridors
a. Service headways no more than 15-minutes during weekday peak periods and 30-minutes during all other times.
b. Span-of-service of at least 14 hours.
c. Service offered seven days a week.

3.2.1 Premium Transit Corridors

A key recommendation is the identification and establishment of "Premium Transit Corridors." These local bus corridors are those that have the most ridership, greatest potential for growth, and that need the highest frequency and highest level of passenger amenities. The nine corridors identified for "premium" designation are:

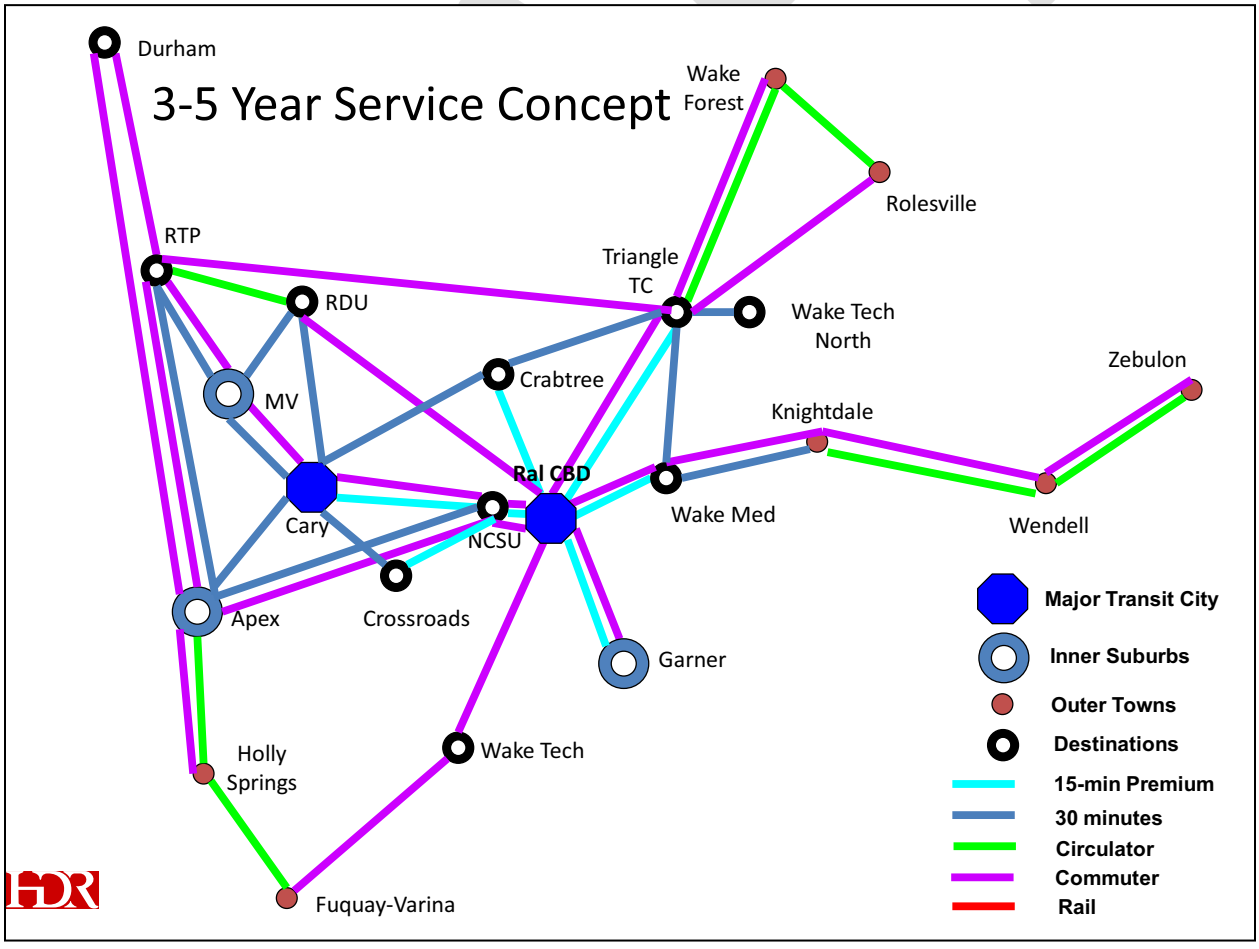
- Capital Boulevard
- New Bern Avenue
- Rock Quarry Road
- South Saunders Street
- Avent Ferry Road
- Hillsborough Street
- Glenwood Avenue/Oberlin Road
- Six Forks Road
- Falls of Neuse Road

These corridors will have a combination of frequent, all day, seven-day-a-week service and improved pedestrian amenities. Service will be offered at least every 15 minutes during weekday peaks and at least every 30 minutes during off peaks and weekends. They will provide a high level of service to all quadrants of the City, and will clearly identify to existing and new riders where to go if high quality transit service is desired.

3.2.2 Overall Wake County Service Concept

Exhibit 3-1 is a conceptual representation of how the overall services fit together for the entire county. It shows the types of service connections that will be provided among the major transit locations and all of the Wake County municipalities and how CAT's local services fit in with the overall concept. Note that for simplicity's sake, not all destinations or premium corridors have been shown. As illustrated, the Raleigh downtown continues to be an overall focal point for transit services, but substantial increases in crosstown services are provided, with many additional focal points established around the county.

Exhibit 3-1
Wake County Short Range Service Concept



The following sections describe how the CAT changes will be phased in over the next three to five years.

3.3 Recommended Approach to Short Term Changes

The approach used in determining the short term priorities for CAT were based upon several overall themes:

- In the first year (FY 2013), do as much as possible within existing funding
- Establish the long-term route network
- Reinvest savings from poorly used services into areas of greatest need
- In 2014 and beyond, add service and facilities by premium transit corridor
- Incrementally implement long-term service network

Expenses beyond the initial year, which can be done within the existing funding levels, will require additional funding. As such, the timing of these changes is subject to adjustment to stay within available resources. The changes presented have been determined to be within the overall guidelines of the *2040 Capital Area Bus Transit Development Plan*. Should adjustments be required, the overall themes above should be used to determine the revised phasing.

3.3.1 Limitations of this Plan

The recommendations in this plan have been developed based upon the best information available at the time, and on input received from the affected areas. Circumstances can change, and as the recommendations move through the implementation process, further refinement is to be expected, especially for changes beyond FY 2013 (July 2012 – June 2013). As the results of the service changes in the first year are known, the plans for the later years should reflect lessons learned.

The service changes below have not been fully developed. After public input is received, the routes may need to be refined and then schedules need to be determined. The schedule development should be based upon the most current and complete information that's available so that running times are realistic. Excessive layover times, especially at intermediate timepoints, should be eliminated, and overly aggressive schedules should be avoided. Timepoints should be set approximately 10 minutes apart to give a guide to riders on when to expect their bus, but not be overly prescriptive on the time at individual locations.

Suggested On-Time LOS Standard
For CAT, a reasonable target is LOS "C", or 85% of the trips arriving no more than 5 minutes late at a timepoint, or leaving a timepoint early. See Technical Memorandum #2 in the Appendix for more details.

With the adoption of the new TransLoc bus tracking system[4], real-time travel information is available. This data should allow for the preparation of accurate running times for all routes and eliminate much of the guesswork that has historically been required to develop schedules.

3.3.2 Ridership Levels

Ridership estimates for the service changes have not been specifically prepared. As one element of the overall Wake County transit planning effort, the CAT short range plan is rolled into the countywide plan. Triangle Transit will be incorporating the revised CAT route structure into subsequent Triangle Regional Model travel demand runs. These subsequent runs will develop ridership estimates for each route.

Routes were designed with desired performance levels in mind (see sidebar). These levels are similar to the performance of the current CAT routes and similar routes throughout the country.

Targeted Ridership Levels
While a specific ridership estimate (projection) was not developed, the services were designed to achieve a targeted ridership performance level. For regular local routes, which are most service operated by CAT, the targeted passengers per revenue hour is 25 for weekdays, 20 passengers/hour for Saturdays, and 15 passengers/hour for Sundays. For connector-type services, a lower target of 12 passengers/hour weekdays, 10 passengers/hour Saturday, and 8 passengers/hour Sundays is desired.

The elasticity approach provides a general indication of what level of ridership increase could be expected with the proposed service changes. Elasticity measures the change in one variable against the change in another variable. For example, if the service elasticity is 0.5, for every 10% increase in service hours, ridership could be expected to increase by 5%. Service elasticity in some studies range from +0.6 to +1.02, with an average between +0.76 and +0.78[5]. Smaller urban areas, and areas with lower beginning service levels had the greatest elasticity, where larger cities or cities that already had a good amount of service had lower elasticities.

Raleigh, comparatively, has a low level of transit service, especially in terms of the frequency of service. Most routes operate at best every 30 minutes during peak times, and hourly during the middle of the day. Doubling service, as is proposed for many routes, would cut the headway times in half, from every 30 minutes to every 15 minutes or from every 60 minutes to every 30 minutes. From a rider's perspective, this is a dramatic improvement in service, and ridership levels respond accordingly.

Overall, the *2012 CAT Short Range Transit Plan* calls for a 77% increase in the hours of annual service provided between 2012 and the end of 2016. Based upon the elasticity factors, ridership could be expected to have a similar increase, from about 5.2 million annual riders to 9.2 million. Ridership levels

[4] See http://triangle.transloc.com/ for real-time bus information on all systems in the Triangle.
[5] See for example,Pratt, Richard, et al. *TCRP Report 95: Traveler Response to Transportation System Changes; Chapter 10: Bus Routing & Coverage*. Washington, DC: Transportation Research Board, 2004.

may increase even more because the first year of the transit plan reallocates hours from unproductive routes and times to areas where ridership levels are highest. Overall hours of service do not increase, but the headways on key routes are cut in half.

3.4 FY 2013 Service Changes

During the first year of the *2012 CAT Short Range Transit Plan*, numerous changes are recommended for implementation. These changes collectively will simplify the system by adding service on holidays; eliminating the practice of having a separate nighttime and weekend system; simplifying the route structure by streamlining the routes; and begin implementing high frequency service on the premium transit corridors.

These changes are extensive and will affect every route in the system, primarily due to the changes in the nighttime service and the addition of more holiday service. As such, the changes may need to be phased in over the year. CAT typically makes one set of schedule changes in any given year at the time of the changeover in the operator work assignments (the operator pick). This operator pick customarily occurs in January, and phasing the changes will require additional operator picks. Based upon public comments and the detailed evaluation of the changes in work assignments by the service contractor, adjustments to the phasing plan outlined below may occur.

The division of the changes into two phases is a suggestion as a way to minimize the burden on staff and the riders. The first phase is those changes needed to adjust schedules, while Phase II requires some route changes. They could all be done at once, or the changes could be done in three phases, with the first phase consisting only of the holiday changes. Since the 4th of July occurs immediately after the start of CAT's fiscal year, the holiday changes are recommended to be in Phase I. The other changes could be delayed until later in the year, but the longer they are delayed, the longer before riders see any benefits.

3.4.1 Phase I Changes – July 2012

CAT's fiscal year begins July 1, and service changes are recommended for implementation at the beginning of the fiscal year. In 2012, July 1 falls on a Sunday, which is the traditional day when service changes are implemented. Implementing changes on this date also allows the holiday schedule changes to include holiday service on the 4th of July for the first time.

Changes during this initial phase are all scheduling changes. The few "routing" changes are to adjust selected trips on individual routes but are not adjustments to how the route operates during weekday daytime. There are no capital changes during this phase nor are any changes required to the bus fleet.

3.4.1.1 *Holiday Schedule Changes*

Exhibit 3-2 shows the services offered by CAT and the other transit providers in the Triangle on the major holidays. Wolfline service is not shown; their schedule is entirely based upon the schedule of the university. As indicated, DATA in Durham provides a robust amount of holiday service; Christmas Day is the only day they do not provide bus service. Triangle Transit offers different service levels from the other providers reflecting that theirs is more of a commuter market while the other providers are used for a greater variety of purposes. Note that Columbus Day, Veteran's Day, and President's Day are not shown. All providers operate a weekday schedule on those days.

Exhibit 3-2
Holiday Schedules

Holiday	CAT	C-Tran	DATA	Chapel Hill	Triangle Transit
4th of July	None	None	Sunday	None	None
Labor Day	None	None	Sunday	None	None
Thanksgiving Day	None	None	Sunday	None	None
Thanksgiving Friday	Friday	Friday	Friday	Friday	Saturday
Christmas Eve	Weekday	None	Weekday	Weekday	None
Christmas Day	None	None	None	None	None
New Years Eve	Weekday	Weekday	Weekday	Weekday	Weekday
New Years Day	None	None	Sunday	None	None
MLK Day	None	None	Sunday	Monday	Saturday
Good Friday	Friday	None	Friday	Friday	Saturday
Memorial Day	Saturday	None	Sunday	None	None

For simplicity's sake, both for the transit provider and rider, holiday schedules are usually either a Saturday or a Sunday schedule. This means that a route would operate the same service on the holiday as it operates on either the Saturday or Sunday. If a route does not operate on Saturday or Sunday, then no service would be provided on that holiday. For the "movable day" holidays, those that occur on a specific date (4th of July, Christmas Eve, Christmas Day, New Years Eve, New Years Day), the "holiday" level of service is provided on the observed weekday of the holiday, generally the Friday before if the holiday is on a Saturday, or the Monday after if the holiday is on a Sunday.

The ridership levels from DATA provide a very good indicator of how much service is should be provided by CAT for each of the holidays. Ridership levels on each system for all holidays over the past two years were compared with the average weekday, Saturday, and Sunday ridership levels to identify how much service is warranted. Overall, the average Saturday had 66 percent of the ridership level on an average weekday, and Sunday had 24 percent of the average weekday ridership. Saturday service levels are therefore recommended for days that have about 50-75 percent of an average weekday ridership, and Sunday service is recommended for days with ridership between about 10-50 percent of the average weekday. Days with ridership above 75 percent of the average weekday are recommended for a regular weekday schedule and days with less than 10 percent of the average weekday are recommended for no

service. These parameters set a high standard of providing service and are reflective of most larger systems around the country.

Exhibit 3-3 shows the recommended service levels for CAT compared with the current service offered. Ideally, the other local systems in the Triangle will also adopt these service levels so that the individual rider will have a consistent service level no matter where they live.

Exhibit 3-3
Recommended Holiday Schedules

Holiday	Recommended Service Level	Current CAT Service
4th of July	Sunday	None
Labor Day	Sunday	None
Thanksgiving Day	None	None
Thanksgiving Friday	Saturday	Friday
Christmas Eve	Saturday	Weekday
Christmas Day	None	None
New Years Eve	Saturday	Weekday
New Years Day	Sunday	None
MLK Day	Saturday	None
Good Friday	Friday	Friday
Memorial Day	Sunday	Saturday

The result is the operation of four "Saturday" holidays and four "Sunday" holidays. For the movable day "Saturday" holidays, if the actual holiday is on a Sunday, then a Sunday level of service would be provided, with a Saturday level of service provided on the following Monday when most people are off work. Five days receive an "upgrade" in service – 4th of July, Labor Day, New Years Day, and MLK Day. Four days receive a lesser amount of service – Thanksgiving Friday, Christmas Eve, New Years Eve, and Memorial Day. The lower amount of service is in line with actual ridership levels on these days. This balancing of supply and demand allows for more days of service at no net cost to CAT.

No service is recommended for Thanksgiving Day. This recommendation is made as a way to control costs and to ease into the provision of holiday service. DATA's ridership on Thanksgiving Day was the lowest of all its holidays at about 20 percent of the average weekday. Still, they were carrying in excess of 3,000 daily boardings on that day. CAT should consider adding Thanksgiving Day service as soon as funding allows.

No service is recommended for Christmas Day in keeping with the current practice of DATA. Most large cities, though, offer a Sunday level of service on Christmas Day since some people do still have to work on that day or will travel to visit family and friends. It is recommended that CAT implement the holiday schedules as outlined above and if ridership materializes as expected and if funding is available, Sunday service be added on Christmas Day in later years.

Weekday service has been assumed for Veteran's Day and for Good Friday. Both of these days are near the cut off point where Saturday service might be a better fit. Additional data should be gathered for these days and the service levels reevaluated at a later date to see if a change is warranted.

3.4.1.2 *Nighttime and Fringe Trip Schedule Adjustments*

A detailed analysis was conducted on the ridership for the off-hours routes and on the first and last trips of the day for all routes. This analysis was done to identify times and locations where service was being provided but not being used or where existing ridership was high indicating a need for more service.

A major objective of the analysis was to merge the off-hour routes into the regular daytime routes. The current route structure is an outgrowth of changes made to the system several years ago when the former demand-responsive service zones were converted into fixed route services. At that time, the origins and destinations of the demand-response riders were essentially connected up. For zones that operated off-hours, the resulting routes were not the same as the daytime routes. To signal to the rider that the off-hour service was different, a different route name and number was applied to the off-hour service.

This approach worked well initially, but as ridership has changed in the ensuing years, the use of off-hour routes now creates more confusion than clarification. It has become a hindrance, especially for new riders who were not familiar with the old service. Therefore, the designation of different routes, names, and numbers during early morning, evenings, and weekends are recommended for discontinuation.

Instead of having separate routes, the span of service on the daytime routes are recommended to be expanded based upon ridership levels. For trips where boardings were greater than five riders, the daytime route is recommended to be extended to cover that trip. For example, ridership on the 39 Cameron Village was more than five riders on each trip from 7 PM to 10 PM. As a result, the span of service on the 16 Oberlin is recommended to be extended until 10 PM to cover for these trips. On the 30 Northeast Evening route, the last trip at 10 PM only had three boardings, but the trips from 7 PM to 9 PM each had more than five boardings. The 3 Glascock is therefore recommended to have its span of service increased until 9 PM to cover for the trips that are used on the 30 Northeast Evening. The 10 PM trip is discontinued.

When an off-hours route duplicated more than one daytime route, the location of the ridership was examined to determine where the riders were actually on board. The resulting recommendations keep ridership at the time and location where service is being used and only discontinues it where fewer than about five riders would lose service.

Exhibit 3-4 shows the early morning network and **Exhibit 3-5** shows the evening service network that will be in place after the separate off-hour routes are merged into the daytime routes.

The decrease in early morning service coverage is misleading – the areas losing service all have very low ridership levels – generally less than 5 persons per route per direction. So even though the coverage area is shrinking, few riders lose service. The savings in this reduction have been reapplied elsewhere in the system, notably some routes have actually gained earlier service based upon the passenger loads on their current first trip.

As shown on the evening map, a few areas with very low ridership will lose service – Glenwood Avenue to Brier Creek, with a limited number of trips on the 70e Brier Creek; Edwards Mill Road, Blue Ridge Road, and Creedmoor Road on the 4 Rex Hospital; Six Forks Road, Spring Forest Road, Millbrook Road, and Hardimont Road on the 2 Falls of Neuse and 29C North Night. Service is added on Lassiter Mill and Northclift on the 8 Northclift and continuous service on Falls of Neuse.

Marked up dispatch sheets were prepared as part of this detailed examination of the schedules. These mark ups were submitted and reviewed by CAT officials and the staff of the CAT contractor.

Exhibit 3-4
Early Morning Route Changes

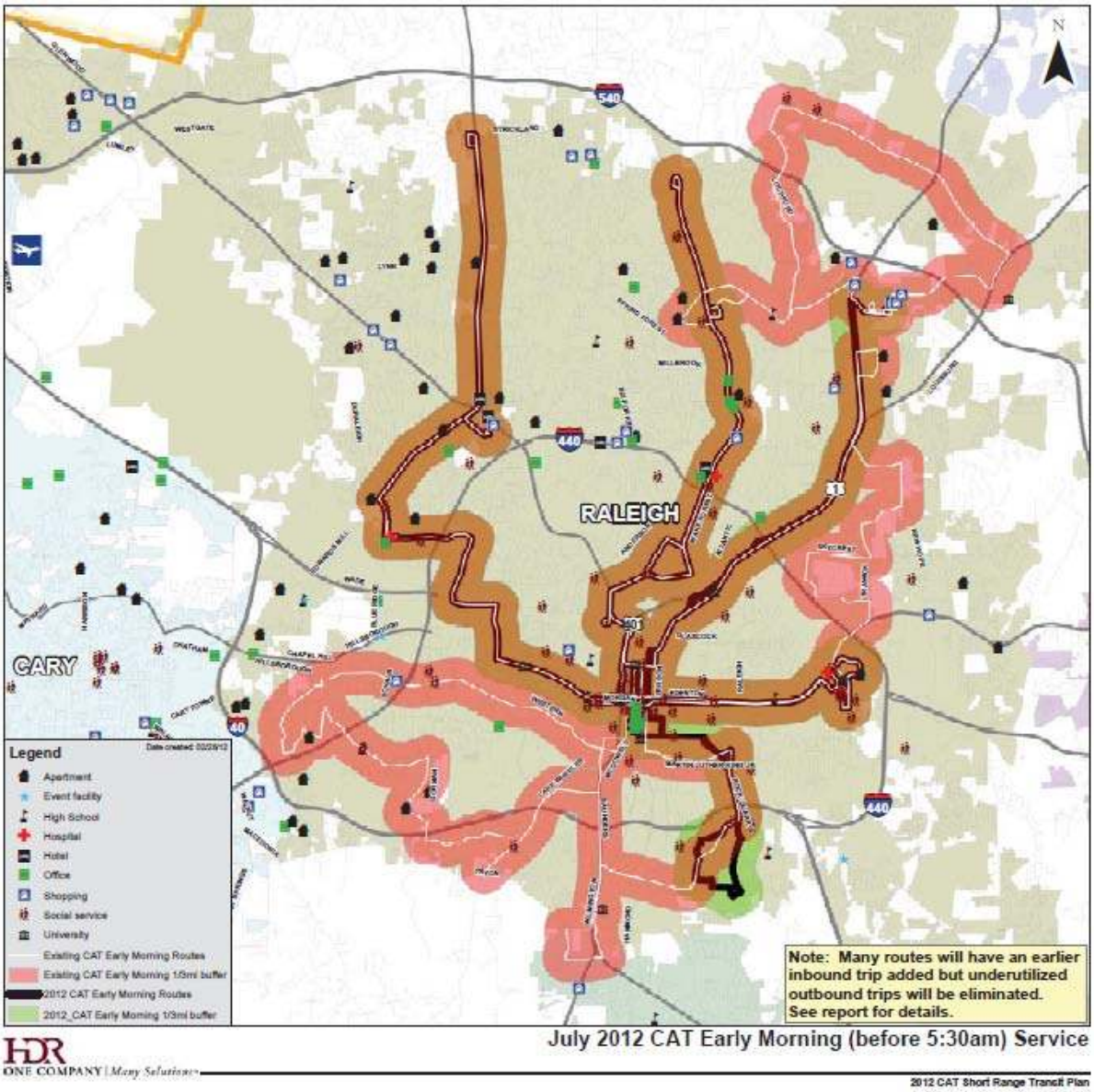
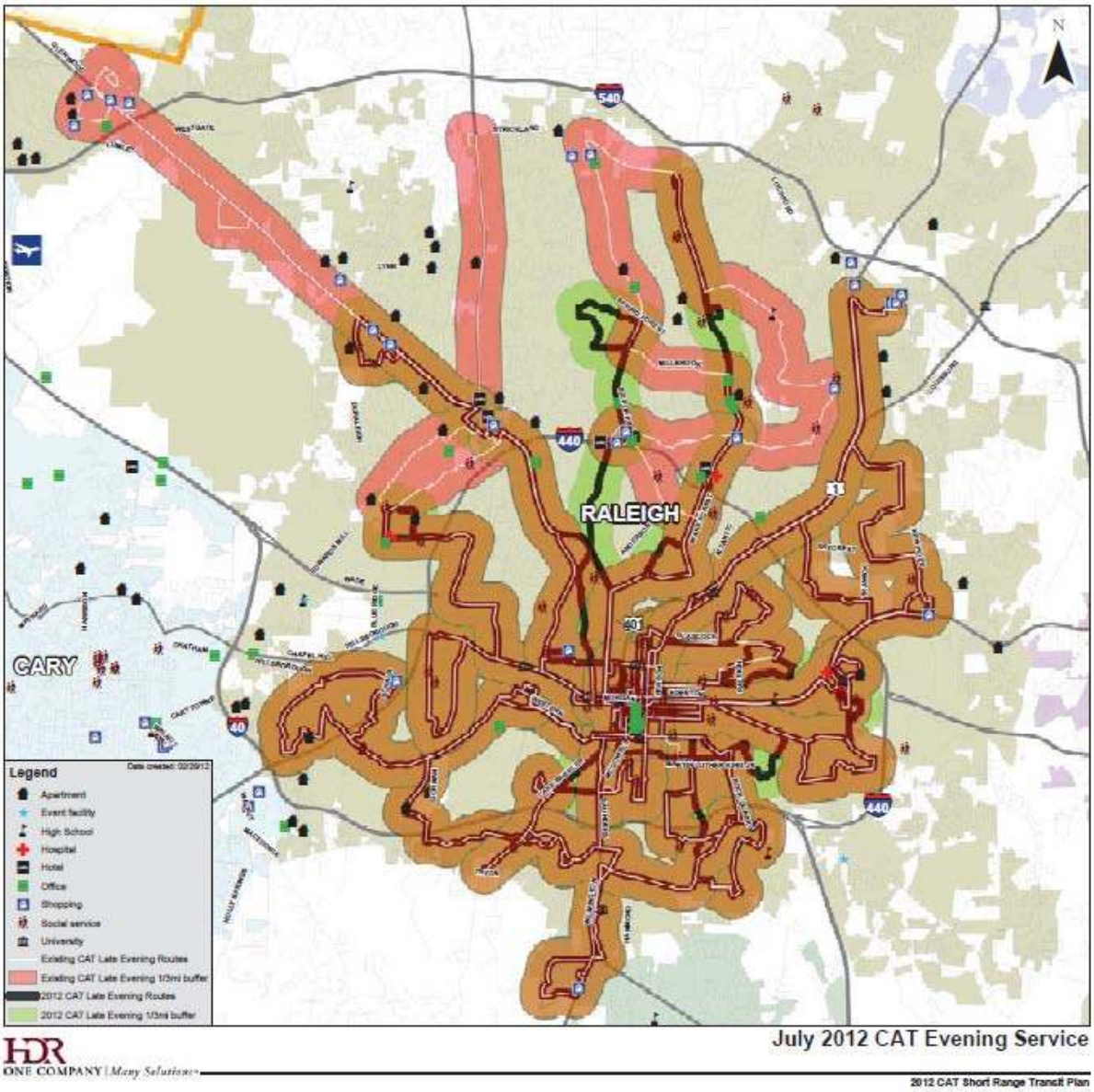


Exhibit 3-5
Evening Route Changes



All routes, both daytime and off hours, weekdays and weekends, were examined to see if the span of service needed to be increased or decreased. Ridership on the first few trips and the last few trips of the day were examined in detail. The guideline for making a decision on changing the span was that if a trip had more than 20 boardings, an earlier or later trip was warranted; if a trip had five or fewer boardings, the trip was discontinued; for trips with between five and 20 boardings, the span of service was left unchanged.

In no case were trips recommended to be eliminated after 6 AM or before 6 PM. Service during these hours was considered to be the minimum amount required. Regardless of ridership levels, the first trip of the day would be no later than around 6 AM and the last trip of the day would not be before about 6 PM.

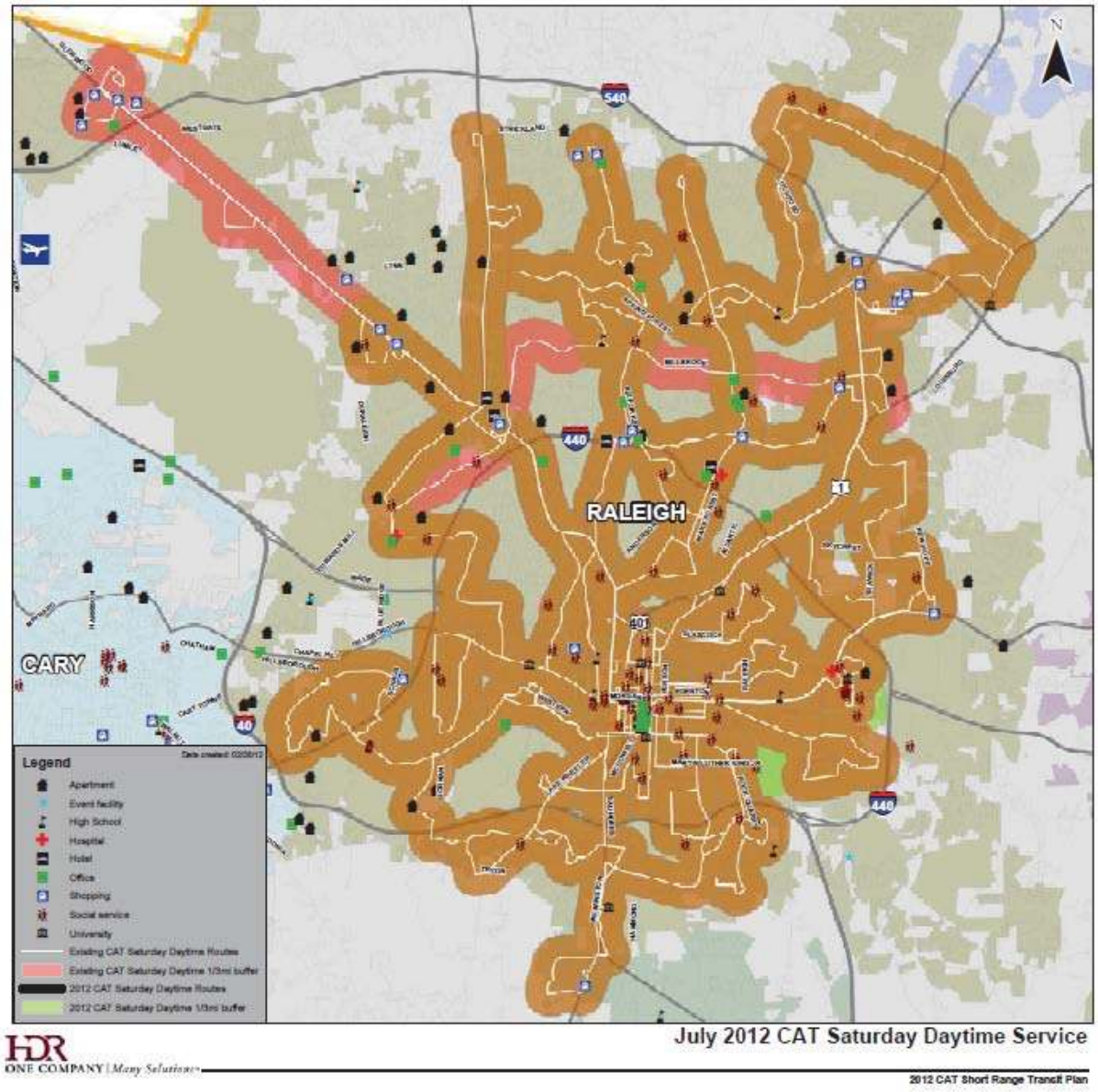
As a result of this finely tuned approach, all off-hour routes can be merged into their daytime counterparts and service spans can be adjusted on all routes to match demand with no increase in costs. The resulting system should have a much greater productivity because service is being removed from areas where it is very poorly used and redirected into areas with a clear pent up demand.

3.4.1.3 *Saturday Service Adjustments*

Due to low ridership, the 16 Oberlin route on Saturday is recommended to terminate at Crabtree. There were few riders on Blue Ridge Road, and the 4 Rex Hospital continues to provide a connection between Crabtree and Rex Hospital.

Two routes are proposed to have their Saturday service discontinued due to low ridership – 23C Millbrook, with 167 boardings all day, and 70e Brier Creek, with 69 boardings all day. Saturday service is not a minimum service requirement, and both of these routes have poor performance. Additional changes are planned for these routes in later years, and Saturday service will be reevaluated at that time. **Exhibit 3-6** shows the resulting Saturday route network.

Exhibit 3-6
Saturday Route Changes



3.4.1.4 *Frequency Adjustments for Overloads*

The fine tuning of the hours of service as outlined above result in some savings for the CAT system. These savings are recommended to be reinvested into the two most heavily used routes – 1 Capital and 15 Wake Med. Both of these routes have overloads on some trips, and both are slated to be premium transit corridors as highlighted in the *2040 Capital Area Bus Transit Development Plan*. The

savings allow some of the increase service that is warranted on these two routes to be implemented at no cost.

The changes that can be implemented on the 1 Capital are:

- Decrease the 1 Capital peak headway to 15 minutes, giving the route a 15 minute peak, 30 minute midday headway
- Decrease 1 Capital Saturday to a 30 minute headway, giving it a 30 minute headway all day Saturday. This is accomplished by moving the tripper buses to operate a half hour later.

On the 15 Wake Med, the savings allow:

- Decreasing the 15 Wake Med Saturday to a 30 minute headway

With these adjustments, the 1 Capital and 15 Wake Med become the two routes that offer a 15-minute headway during weekday peaks and 30-minute headway weekday midday, plus a 30-minute headway on Saturdays.

As additional funding becomes available, the 15 Wake Med will have weekday midday service increased, but the savings from this first phase was not sufficient to cover this expense.

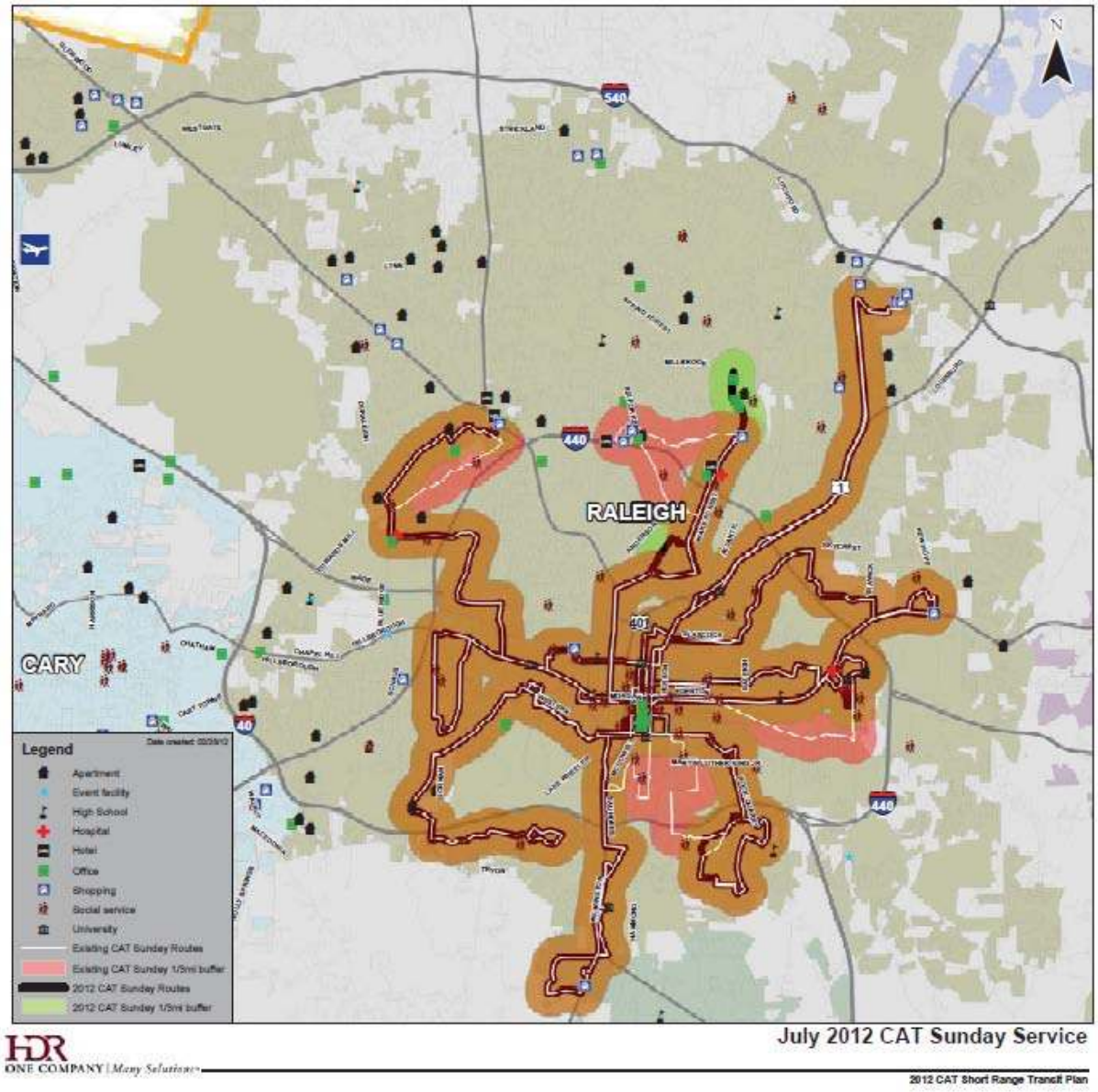
3.4.1.5 *New Sunday Service*

With the redesign of the service network to merge the off-hour routes into the weekday daytime routes, changes are warranted to the Sunday services. Most Sunday routes are similar variations of the off-hour routes, and to provide a simpler to understand system, several regular weekday routes are recommended to receive hourly Sunday service. The new services are:

- 2 Falls of Neuse – extend along weekday route to Millbrook (removes Sunday service from North Hills and extends it to Millbrook)
- 4 Rex Hospital – operate weekday route to Crabtree (removes Sunday service from Blue Ridge Road)
- 5 Biltmore Hills – weekday routing (removes Sunday service from portions of 13 Chavis Heights and 22 State Street)
- 7 S. Saunders – weekday routing (removes Sunday service from portions of 21 Caraleigh)
- 15 Wake Med – weekday routing (removes Sunday service from Poole Road and portions of Sunnybrook Drive)

Note that because of cost constraints, one "off-hour" route is maintained – the 31 New Hope Commons. This route will only operate on Sundays until sufficient funds are available to replace it with regular weekday routes. **Exhibit 3-7** shows the resulting Sunday service network.

Exhibit 3-7
Sunday Route Changes



3.4.1.6 *Summary of July 2012 Recommendations*

Exhibit 3-8 presents a summary of the recommendations for each route.

Exhibit 3-8
Summary of July 2012 Service Changes

Route	Change
1 - Capital	Add earlier weekday trip; decrease peak headway to 15 minutes. SATURDAY decrease peak headway to 30 minutes
2 - Falls of Neuse	Add earlier OB trip; extend evening service until 10 PM. SATURDAY extend evening service until 10 PM. SUNDAY add service to Millbrook from 8 AM to 7 PM.
3 - Glascock	Extend evening service until 9 PM. SATURDAY delete first trip; add evening service until 9 PM; change loop to always operate counterclockwise;
4 - Rex Hospital	Delete first IB trip; add evening service until 11 PM between Rex and downtown. SATURDAY delete service on Creedmoor before 9 AM; add evening service between Crabtree and downtown until 11 PM. SUNDAY operate same hours as 38.
5 - Biltmore Hills	Add earlier trip; extend evening service until 11 PM. SATURDAY extend evening service until 11 PM. SUNDAY add service from 8 AM to 7 PM.
6 - Crabtree	Delete first OB trip and add earlier IB trip; extend service until 8 PM. SATURDAY extend evening service until 9 PM.
7 - S. Saunders	Extend evening service until 10 PM. SATURDAY delete first trip; extend evening service until 10 PM. SUNDAY add service from 8 AM until 7 PM.
8 - Northclift	Delete first OB trip; extend evening service until 8 PM. SATURDAY delete first trip and extend evening service until 7 PM.
10 - Longview	Add evening service until 9 PM. SATURDAY delete first trip; add evening service until 9 PM.
11 - Avent Ferry	Delete first OB trip and add earlier IB trip; extend evening service until 11 PM. SATURDAY delete first OB trip; add later evening service.
12 - Method	Delete first OB trip and add earlier IB trip;
13 - Chavis Heights	NO CHANGE
15 - Wake Med	Reduce early morning OB trips; extend 30 minute headways until 9 PM. SATURDAY decrease headways to 30 minutes. SUNDAY add service from 8 AM to 7 PM.
16 - Oberlin	Delete first trip; extend evening service until 10 PM. SATURDAY delete service to Rex; add later IB trip.
18 - Worthdale	Extend evening service until 11 PM. SATURDAY add service from 6 AM to 11 PM.
19 - Apollo Heights	Extend evening service until 8 PM.
21 - Caraleigh	Extend evening service until 9 PM.
22 - State St	Extend evening service until 10 PM.
CONNECTORS	
7C - Carolina Pines/Rush	SATURDAY delete first and last trips.
8C - Sawmill	SATURDAY delete first and last trips.
11C - Buck Jones	Delete last IB trip. SATURDAY delete first and last trips.
15C - Trawick	Delete last IB trip.
23C - Millbrook	SATURDAY delete service.
24C - North Crosstown	Delete last trip. SATURDAY delete first trips.
25C - Triangle Town Center	Delete first trip. SATURDAY delete first trip.

Route	Change
EXPRESSES	
55E - Poole Rd Express	Redesignate as limited stop trips on 18; check trip times with new deadheading.
70E - Brier Creek	Add 9 AM and 6 PM trips; delete last two trips. SATURDAY delete service.
EARLY/LATE SERVICES	
26C - Early East	DELETE
27 - Southeast	DELETE
28 - Southwest	DELETE
29C - North Night	DELETE
30 - Northeast	DELETE
31 - New Hope Commons	Keep on Sundays
32 - Sanderford Road	DELETE
33C - Glenwood-Creedmoor	DELETE
34 Wake Med Poole Rd	DELETE
35 - Poole Road	DELETE
36 - Garner Station	DELETE
37 - North Hills	DELETE
38 - Blue Ridge	DELETE
39 - Cameron Village	DELETE

Exhibit 3-9 summarizes the revenue hour changes for the July 2012 service adjustments. The net effect is the equivalent of adding 13 minutes of service on each weekday, a negligible amount.

Exhibit 3-9
Net Change in Revenue Hours

Category	Revenue Hours	Weekday Equivalent
Weekday Hour changes	-4:34	-4:34
Saturday changes	-31:03	-7:04
Sunday changes	0:00	0:00
Holiday changes	-1:22	-1:22
1 Capital to 15 peak	+11:10	+11:10
15 Wake Med to 30 Saturday	+9:00	+2:03
NET CHANGE		+0:13

At CAT's $86 cost per hour, these changes will cost less than $5,000 annually.

3.4.2 Phase II Changes – January 2013

In Phase II, the focus is on addressing the overloads on the 15 Wake Med during the midday period. The need is to take the headway down to 15 minutes from 30 minutes, which requires doubling the number of buses and hours during the midday. The resulting schedule will be a 15-minute service during weekdays daylight hours.

3.4.2.1 *Route Changes*

To implement this change at no cost, the 13 Chavis Heights is recommended to be replaced by a modification of the 22 State Street. It would be rerouted along Blount, Cabarrus, and Chavis Way, and MLK Blvd. outbound instead of along Lenoir. And inbound the route would be along MLK Blvd, Chavis Way, and Lenoir. The 13 Chavis Heights, while serving a key public housing project, is within one-quarter mile of the 19 Worthdale, 21 Caraleigh, and 22 State Street. While some riders may have to wait at a new stop, any additional walking distance is short, and is minimized with this rerouting.

The total weekday hourly savings from discontinuing the 13 Chavis Heights is 9:41, with an additional 2:28 weekday equivalent savings from discontinuing Saturday service, for a total weekday equivalent of 12:09. The increase in hours on the 15 Wake Med is 11 hours weekday, resulting in a net savings of about 1 hour weekdays. There are no costs to modifying the 22 State Street to cover a portion of the 13 Chavis Heights. At CAT's cost of $86 per hour, the net savings is about $22,000 annually.

At the same time this change is made, CAT should examine the potential of extending the 15 Wake Med to Walmart on New Bern. This extension may require some changes around the apartments by Wake Med, and adjusting the 19 Apollo Heights, but CAT has had to make several adjustments lately due to changes in the roadway configuration in the area. If the time required to go through the apartments can be reduced, there may be sufficient time to go to Walmart and return.

No capital changes are required in Phase II.

Maps of these individual route changes, and all route changes, are provided in the **Appendix**.

3.4.2.2 *Premium Corridor Service Levels*

At the end of the FY 2012 changes, two of the premium corridors will have their service levels raised to premium status –

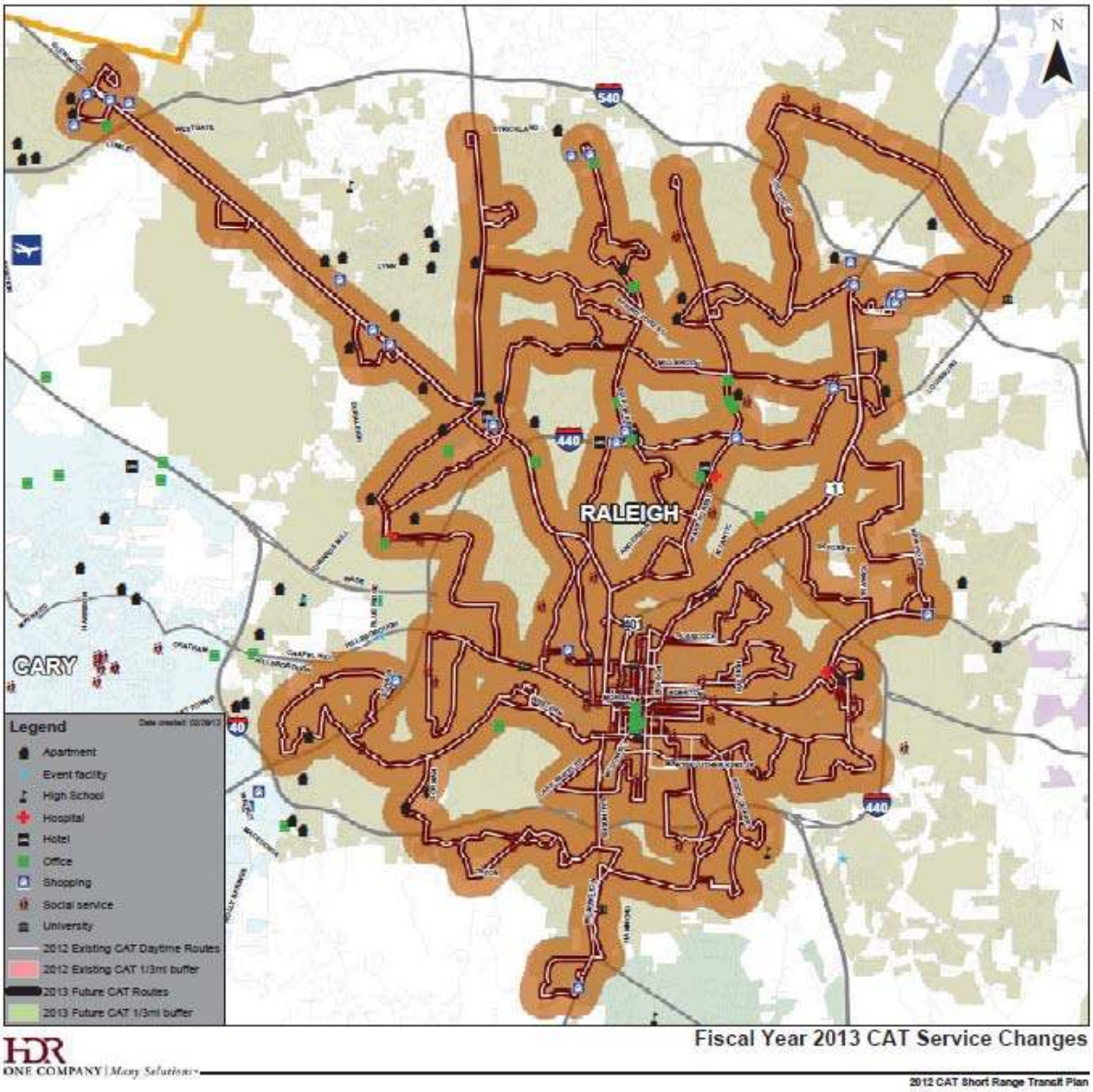
- Capital Boulevard will have service every 15 minutes peak and 30 minutes midday; Saturday service will operate every 30 minutes. Sunday service will remain at every 60 minutes and will be upgraded in later years.
- New Bern Avenue will have service every 15 minutes peak and better than premium status in midday with 15 minute service. Saturday service will be upgraded to every 30 minutes. Sunday

service will remain at every 60 minutes and will be upgraded in later years. Later years will also see the extension of premium service further out New Bern to the Walmart.

3.4.3 Summary

Exhibit 3-10 shows the systemwide changes in the route coverage for FY 2013 compared to the existing daytime service. Even though the 13 Chavis Heights was discontinued, service coverage, shown by the one-third-mile buffers around the routes did not change.

Exhibit 3-10
FY 2013 Systemwide Service Coverage Changes



3.5 FY 2014 Service and Capital Changes

The focuses of the FY 2014 service changes are to complete the route network restructuring and to continue implementing the program of premium transit corridors. No phasing is anticipated for these changes; instead they would all be implemented at the time of the regular operator pick in January 2014. While almost 20 routes will be affected, a sizable percentage of the route network, the burden on staff and riders is not too high. Waiting until January 2014 provides sufficient time for the new funding to be in place and to acquire the additional vehicles that will be required for operation. Individual route maps are provided in the Appendix.

3.5.1 Unsettled Funding

Changes in 2014 will require additional funding to be implemented. This funding could come from an increase in Raleigh general funds, state, federal, or private funds, or some other source. State and federal funding increases are possible, but are highly uncertain. Under current federal legislation, Raleigh could expect to see an increase in the "formula" funds in proportion to the rapid increase in population that has occurred from 2000. A significant caveat is that the current federal debate is unsettled, with some proposals calling for keeping funding levels constant and others calling for a dramatic reduction in federal funding support for transit.

A more likely scenario for increased transit funding is the passage of the local sales tax dedicated to transit. This potential calls for a voter referendum on increasing the sales tax by one-half a percent (a nickel on every $10 purchase). The referendum would need to be passed by Wake County as a whole, not just Raleigh, and would fund transit improvements throughout the county. As this plan is being written, Wake County Commissioners are considering whether to call for this election in November 2012. Should they do so, and should the referendum pass, additional funds for transit would become available about three months after the referendum, and could be used for the FY 2014 service changes described below.

Regardless of the funding source, the changes depicted below will not occur unless additional funds are provided to transit.

3.5.2 Service Changes

3.5.2.1 *New Bern Avenue Area Improvements*

During FY 2014, the improvements along New Bern Avenue to the 15 Wake Med are recommended to continue. The 15 Wake Med route will be extended to the New Bern Walmart, eliminating the need for riders to transfer to the 15C Trawick Connector at Wake Med Hospital. To provide for a quicker trip along the corridor, the deviations around the Wake Med Hospital will be reduced. The 15 Wake Med will continue to go into the hospital complex but will exit along Swinburne, Fallstaff, and Sunnybrook

back to New Bern Avenue. This change eliminates travel to Kidd Road and the operation through the housing complex on Calumet. Instead, the 19 Apollo Heights will serve this area.

The 15 Wake Med will also have its Sunday service increased from a 60-minute headway to a 30-minute headway.

The 19 Apollo Heights is recommended for two reroutings. Around Wake Med, the route will be extended to take over the Calumet service from the 15 Wake Med. Without this change, the 15 Wake Med would have a time consuming detour off its main route. Instead, the 19 Apollo Heights can serve the area at its end-of-line. Secondly, the route will change in downtown to shorten it to operate inbound along Wilmington instead of McDowell. This provides increase service to Shaw University. The 19 Apollo Heights gains Sunday service

The 15C Trawick Connector is recommended for replacement by the extension of the 15 Wake Med and by the implementation of two new routes – the New Hope Crosstown and the Northeast Crosstown. The New Hope Crosstown will provide a direct connection among the New Bern Walmart, Wake Tech North Campus, and Triangle Town Center. It will originate at the New Bern Walmart, travel north on New Hope Road, eats on Louisburg Road/US 401 to the Wake Tech North Campus, and west on Fox Road to Triangle Town Center. Service will be provided every 30 minutes peak, 60 minutes midday, and 60 minutes on Saturday.

The Northeast Crosstown will provide a significant increase in mobility in the northeast area of Raleigh. It will directly connect Wake Med, Highwoods, Duke Raleigh Hospital, North Hills, and Crabtree Valley Mall. Riders traveling in this area will no longer need to travel downtown to complete their trip. From Wake Med, the route will travel principally along New Bern Avenue, Lake Woodard, Brentwood, Highwoods, Wolfpack, Bush, St. Albans, and Northbrook. Service will be provided every 30 minutes peak, 60 minutes midday, and 60 minutes on both Saturday and Sunday. Given the number of medical facilities and major shopping locations served by this route, it is being implemented with Sunday service.

With the changes outlined above, the New Bern Premium Corridor has its route improvements fully implemented. Additional growth in service will be dependent upon growth in ridership.

3.5.2.2 *South Saunders Area Improvements*

The 7 South Saunders is recommended for two improvements. First, the schedule is recommended to be brought up to the premium corridor standards. Secondly, if the Town of Garner is supportive, the 7 South Saunders should be extended through downtown Garner to the White Oak Shopping Center. This extension, though, should not be the financial requirement of the City of Raleigh. Either the Town of Garner should pay the incremental cost, or if the Wake County dedicated sales tax is in place, the sales tax could fund the incremental cost.

For the schedule changes, the route is recommended to have its peak headway reduced to every 15 minutes from every 30 minutes; keep the midday headway unchanged at every 30 minutes, and double the service on Saturday to every 30 minutes.

Should the route extension be implemented, this extension would operate from the current terminus at the Walmart to White Oak Shopping Center via Government Road, Foxwood Drive, Aversboro Road, Timber Drive, and White Oak Road. US 70 would provide a faster and more direct route, but this is a fast moving highway and is unsuitable for local bus service.

3.5.2.3 *Six Forks Road Improvements*

The Six Forks Road corridor will have its service reorganized to provide a single route along the length of the corridor. This change involves merging the 8 Northclift with the 8C Sawmill Connector. With this change, riders from downtown will have a one-seat ride all the way out to Six Forks Station. Implementing this change will require some changes to the existing routes. From downtown, the new Six Forks route will follow the current 8 Northclift route to Millbrook. From that point it travels north on Six Forks to the current end-of-the-line of the 8C Sawmill at Strickland. This streamlined routing provides faster and more direct travel, but does remove service from several streets with low ridership. Losing service on the 8 Northclift portion are the turnaround portion on Northclift and Dixon. On the 8C Sawmill portion, the deviations along Newton Road and Longstreet and along Lynn Road are eliminated. Most of the abandoned portions remain within a short walk of bus service, generally about one-quarter mile or 5 minutes. Sunday service every hour will be added along the length of the new route.

To maintain service to the Greyhound terminal, the 2 Falls of Neuse will be rerouted to cover the portion eliminated by the change to the 8 Northclift. From Capital Boulevard, the 2 Falls of Neuse will exit at Peace Street, travel west one block to West Street, and head south to Jones Street where it will pass in front of Greyhound en route to its current routing along Salisbury. Outbound, the 2 Falls of Neuse will follow its current route along Wilmington to west on Lane Street, south on Harrington Street, stopping opposite Greyhound. From there the bus goes west on Jones, north on West Street to Peace and returns to its current route along Capital Boulevard.

3.5.2.4 *Glenwood Avenue/Oberlin Road Improvements*

Changes to this corridor are designed to provide the major route along the portions of the road used by most riders. From ridership counts, this is Oberlin Road from downtown to Glenwood Village, and Glenwood Avenue from Glenwood Village to Pleasant Valley. Therefore, one route will be established along this path, which necessitates changes to both the 6 Crabtree and 16 Oberlin.

The 6 Crabtree will follow its current route between the mall and downtown, but at the mall the route will take over the Blue Ridge Road portion of the 16 Oberlin. This extension should be closely monitored; current ridership is low and may warrant discontinuation at a later time.

The 16 Oberlin receives two changes. One change is to take over the Pleasant Valley portion of the 6 Crabtree. This change puts the heaviest ridership portions on one route. As ridership levels continue to grow, the 16 Oberlin will have its frequency increased to that of the premium transit corridors. The second route change is to change the routing to downtown. Instead of using St. Mary's, the route will continue along Peace Street and follow the same routing as the current 12 Method. This change eliminates a very tight turn from eastbound Peace to southbound St. Mary's for buses traveling inbound. With this change to the 16 Oberlin, the 12 Method will be relocated as described in the next section.

Along with the changes to the routes, the schedules of the 6 Crabtree and 16 Oberlin will be adjusted to stagger their service between downtown and Crabtree Valley Mall. Both routes will continue to offer 30-minute service peaks and 60-minute service midday, but they will alternate so that service between the mall and downtown will be provided every 15 minutes peak and 30 minutes midday. For example, the 6 Crabtree may leave downtown at 7:00, the 16 Oberlin at 7:15, the 6 Crabtree at 7:30, and the 16 Oberlin at 7:45. Running times are similar, and the result will be a doubling of the service between the mall and downtown at no cost.

Finally, the 16 Oberlin will gain Sunday service every hour.

3.5.2.5 *Hillsborough Street Improvements*

As noted above, the routing of the 16 Oberlin will be changed to follow the 12 Method route into downtown. With that change, the 12 Method can be relocated to Hillsborough Street from downtown. It would follow the same routing as the 4 Rex Hospital between downtown and NC State. Along with this change, the schedules of the 4 Rex Hospital and 12 Method would be adjusted so that they operate at staggered times, similar to the alternating schedule described above for the 6 Crabtree and 16 Oberlin. The result will be service every 15 minutes peak and 30 minutes midday between downtown and NC State along Hillsborough Street. This change will, however, eliminate bus service between NC State and Cameron Village, but this distance is less than a 5 minute walk.

3.5.2.6 *Avent Ferry Road Improvements*

Two scheduling only changes are proposed for this corridor. First, the 11C Buck Jones Connector is recommended to have its headway decreased to the policy level of every 30 minutes during peaks from the current hourly service. This change will double the frequency of service during peak times. Secondly, the schedules of the 11 Avent Ferry and 11C Buck Jones Connector should be staggered along Avent Ferry from NC State to the Avent Ferry Shopping Center at Avent Ferry & Gorman. The result on

this stretch of roadway will be a 15-minute frequency peak and 30-minute frequency midday for the concentration of students commuting to NC State.

3.5.2.7 *Miscellaneous Schedule Improvements*

Besides the scheduling changes described above, other routes will have their service improved to the minimum levels. The following routes will have their peak headways decreased to every 30 minutes from their current hourly service: 25C Triangle Town Center Connector; and 40e Wake Tech Express. As an option, the 25C could institute bi-directional service around the loop for the same cost. Both options should be reviewed with the riders during the implementation planning. The 40e Wake Tech Express is recommended to have its stopping area extend to Hoke Street on the south side of downtown. By adding stops at Hoke and at MLK Boulevard, where traffic signals are located, minimum delay will be incurred by riders destined further out, but the accessibility of this neighborhood will be greatly improved.

The 70e Brier Creek Express will have midday service added on an hourly basis. This route will receive further changes in FY 2015, and adding midday service now will help build ridership for the new route.

3.5.2.8 *Premium Corridor Service Levels*

By the end of FY 2014, the Premium Corridor concept will be more fully developed. The corridor service is anticipated to include the following. The check mark shows the two corridors that meet or mostly meet the premium service levels of 15 minutes peak, and 30 minutes midday, Saturday, and Sunday. The Hillsborough corridor falls short because only a portion of the corridor has the full service levels.

- Capital Boulevard – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes.

- New Bern Avenue – service provided seven days per week with peak headways at 15 minutes, midday headways at 15 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. Service levels are extended out to the New Bern Walmart. The corridor also gets capital improvements to the streetside elements and a new transfer location (see capital projects section).
- Rock Quarry Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes.

- South Saunders street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes.

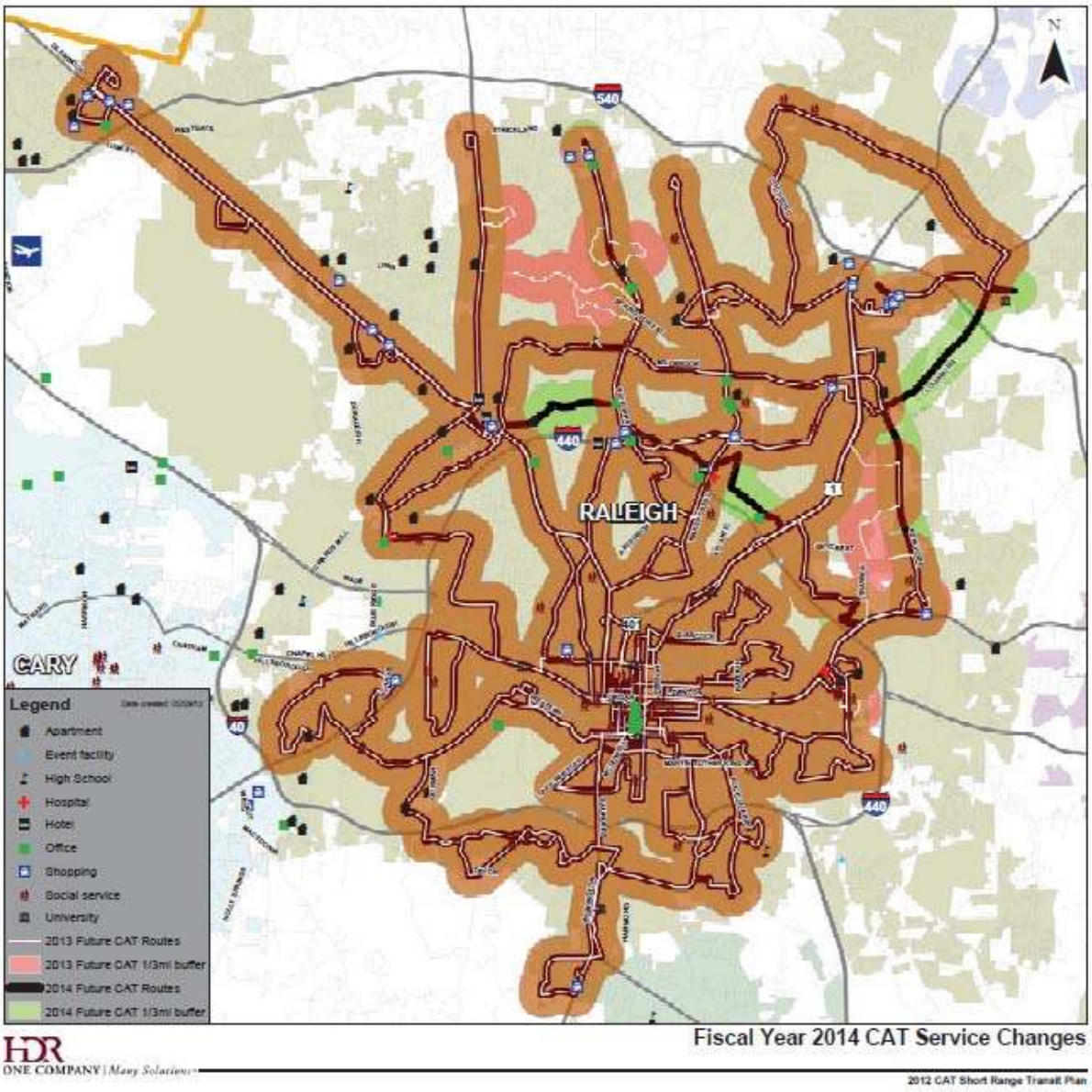
- Avent Ferry Road – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are on the portion of the corridor between NC State and Avent Ferry & Gorman and are achieved though staggered schedules on the 11 Avent Ferry and 11C Buck Jones Connector. The portion of the corridor into downtown has half this service level.
- Hillsborough street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. These service levels are on the portion of the corridor between downtown and Dixie Trail and are achieved though staggered schedules on the 4 Rex Hospital and 12 Method.

- Glenwood Avenue/Oberlin Road – service provided between downtown and Crabtree Valley Mall seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are only between downtown and the mall and are achieved though staggered schedules on the 6 Crabtree and 16 Oberlin. Since the routes follow different paths between the two ends, the high frequency is only on between the two main destinations.
- Six Forks Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes, but only on the outer portion of the route. Continuous service along the corridor is not yet in place.
- Falls of Neuse Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes.

3.5.3 Summary

Exhibit 3-11 shows the systemwide changes in the route coverage for FY 2014 compared to the FY 2013 service coverage. The increases in service coverage are due to the new New Hope Crosstown and the new Northeast Crosstown. The underutilized areas losing service are portions of the 15C Trawick Connector and the 8C Sawmill Connector. Further refinement of these plans with the affected areas may be required closer to implementation.

Exhibit 3-11
FY 2014 Systemwide Service Coverage Changes



3.5.4 Capital Improvements

To support the service changes, several new or improved capital facilities are recommended. In addition, more buses will need to be purchased to provide the expanded services.

3.5.4.1 *Moore Square Renovation*

Moore Square was built in 1988 as the central focal point for CAT services. It is located in the ground floor of the Moore Square Parking Deck, across Blount Street from Moore Square Park. The facility has space for 16 buses at one time, and includes a small customer service booth and separate small restroom facilities for men and women. Some of the bus bays are covered by the parking deck and others just have shelters with benches. As noted in Section 2.3.2, Moore Square has over 10,600 boardings+alightings daily, more than 25 percent of the total daily activity on CAT. This usage is even greater if the R-Line and Triangle Transit riders are included.

In the 24 years since the facility was constructed, no significant renovations or upgrades have occurred beyond the recent removal of some fountains. The current facility has several shortcomings that need to be addressed to prepare it for the next 24 years.

The most critical need is to expand the capacity of the facility for both buses and patrons. The number of bus loading spaces is inadequate for the expansion in CAT service and with the increases in Triangle Transit's commuter services. The passenger waiting platforms are too small for waiting passengers, resulting in an uncomfortably crowded feeling. The customer information area is inadequately sized, as are the restrooms, and amenities for bus operators are inconveniently located upstairs in one of the storefronts on Wilmington.

CAT is undergoing the environmental clearance process to improve the facility and a design contract is anticipated to be let sometime in 2012. The actual construction is anticipated to be in FY 2014, although if sufficient funding is identified, the construction could be accelerated to FY 2013. The upgrades will considerably freshen up the facility, increase capacity, and provide improved amenities for both riders and employees.

3.5.4.2 *New Bern Walmart Transfer Location*

With the changes outlined above, and additional changes in later years, the Walmart on New Bern will become a focal point for transit services on the eastern edge of Raleigh. The capital project in FY 2013 is to establish a "mini-Transit Center" somewhere within close proximity to the Walmart and nearby retail centers. This facility will not be a large transit center with overhead shelters, but is envisioned to be a series of passenger shelters, benches, and information displays arrayed in a fashion to provide easy transferring among routes. Layover facilities for buses will be provided, but no operator or general public restrooms.

3.5.4.3 *New Bern Avenue Premium Corridor Amenities*

In FY 2014, the first of the premium transit corridors is schedule to receive a comprehensive upgrade of the streetside amenities. New Bern Avenue has been selected as the first corridor since it has the greatest ridership of any of the nine corridors.


Premium "Quickline" Shelter

The program of projects for the corridor has not been determined, but is anticipated to include:

- Sidewalks along the length of the corridor on both sides of the street
- Sidewalk connections off the corridor to significant destinations, such as Enloe High School
- Enhanced amenities at stops, including larger shelters, benches, and real-time information displays
- Minor capital improvements to facilitate bus operations, such as signal timing, queue-jumper lanes at intersections, and other low-cost items

The final program of projects will be determined based upon the conditions at the time and feedback from riders, operators, property owners, and city staff.

3.5.4.4 *Miscellaneous Capital Improvements*

The *2040 Capital Area Bus Transit Development Plan* called for a regular program of making streetside improvements along all bus routes. These improvements will not be to the level of the premium transit corridors, but would include additional sidewalks, shelters, and benches throughout the service area.

3.6 FY 2015 Service and Capital Changes

During FY 2015, the focus shifts to the second busiest corridor in the CAT system – Capital Boulevard. The majority of the changes are designed to complete the service network adjustments along the corridor by increasing service frequencies and realigning routes to provide improved crosstown travel.

3.6.1 Service Changes

3.6.1.1 *Capital Boulevard/Triangle Town Center Area Improvements*

The 1 Capital route is almost at premium transit levels, except for Sunday service. During FY 2015, additional Sunday trips will be added so that the route has service every 30 minutes. Additional service may be warranted on weekdays and Saturdays, depending upon demand. At the time of these

improvements, the ridership on the other days should be carefully examined to determine if additional trips are justified.

One routing adjustment may be needed depending upon land development. The City of Raleigh is considering transforming Capital Boulevard as it enters downtown into a more densely developed and walkable area. Should this transformation occur, the 1 Capital should be rerouted to provide continuous travel along Capital Boulevard, rather than exiting at Wake Forest Road to enter downtown.

The 25C Triangle Town Center Connector will be replaced by three new routes – the Atlantic Avenue Crosstown, the Spring Forest Crosstown, and the Durant/Strickland Crosstown. The current 25C Triangle Town Center Connector provides good coverage with the minimum amount of buses and hours possible, but as a one-way loop, travel around the area can be time consuming. These changes break up the loop and provide two-way travel on all streets.

The western side of the 25C Triangle Town Center Connector is taken over by the Atlantic Avenue Crosstown. This is a major new route for Raleigh that provides service to a large area that currently does not have any route and opens up new mobility options by providing another route that does not go downtown. It originates at the Wake Med North Campus and travels south along Litchford Road following the current route of the 25C Triangle Town Center Connector. At the intersection of Litchford and Atlantic Avenue, the route continues south on Atlantic Avenue until Whitaker Mill Road. The route turns west on Whitaker Mill Road, following the same route as the existing 2 Falls of Neuse. The route continues west on Capital/Wade/Daniels/Oberlin and terminates at NC State. The Atlantic Avenue Crosstown provides service every 30 minutes peak and every 60 minutes midday and on Saturday.

Atlantic Avenue does not currently have service, but light-rail transit is being considered for the rail line that runs parallel to Atlantic Avenue. This new route will provide the initial service on the corridor and complement the rail service whenever it is implemented. The service on Wade Avenue will serve the Employment Security Administration (ESC) office, allowing the 8 Northclift/Six Forks route to be rerouted along Six Forks. This route will operate via Wilmington, Wake Forest, and Atlantic to Six Forks. This change removes all service from St. Mary's and Lassiter Mill, but other than the ESC stop and a stop near North Hills Mall, there are few riders.

With the routing of the Atlantic Avenue along Whitaker Mill, the 2 Falls of Neuse can be rerouted to travel along Wake Forest into downtown. This route is also extended along Falls of Neuse Road to connect with the Atlantic Avenue at Wake Med North.

The northern portion of the 25C Triangle Town Center Connector is taken over by the new Durant/Strickland Crosstown. This route provides coverage between the south Rolesville area, Wake Tech North, Wake Med North, and the Six Forks Station Shopping Center. The Durant/Strickland Crosstown provides service every 30 minutes peak and every 60 minutes midday and on Saturday.

The southern portion of the 25C Triangle Town Center Connector is taken over by the new Spring Forest Crosstown and the previously implemented New Hope Crosstown. The Spring Forest Crosstown operates on Spring Forest and Lynn Road from Triangle Town Center to North Hills Drive. At this point it operates along North Hills Drive, Dixon, Millbrook Road, and Lead Mine Road to Crabtree Valley Mall. This route provides new crosstown travel opportunities and directly connects the two biggest malls in Raleigh. Service will be offered every 30 minutes peak and every 60 minutes midday and on Saturday. The implementation of this route will allow Triangle Transit to reorient its 201 North Raleigh route to be an express service operating along I-540.

The 23C Millbrook Crosstown is reoriented to be a continuous crosstown along Millbrook Road. With the introduction of the 54 Spring Forest Crosstown to Crabtree Valley Mall, the 23C Millbrook Crosstown can be rerouted along Millbrook Road to Pleasant Valley. This rerouting provides a direct connection between the Pleasant Valley area and its high ridership to the shopping and employment opportunities at Capital Boulevard. With this rerouting, Saturday service is restored to the 23C Millbrook Crosstown to gauge the interest in weekend travel between these new destinations.

3.6.1.2 *Crabtree Area Improvements*

As noted above, the Crabtree area receives changes during FY 2015, notably the swapping of service between the new 54 Spring Forest Crosstown and the 23C Millbrook Crosstown. Additionally, the 70e Brier Creek Express is replaced by a new circulator/crosstown route, the Umstead Crosstown. This route operates between Pleasant Valley and Brier Creek, and deviates off either side of Glenwood Avenue to get close to the retail and apartment locations. The 70e Brier Creek Express was an experiment to see how best to connect to the Brier Creek area, but it was unsuccessful. A more robust crosstown/circulator may be a better performer. Glenwood Avenue is a transit-unfriendly street, which until just recently had a 55 mph speed limit along portions of the roadway. By implementing a route that wanders around a bit but gets within easy walking distance of more locations, it is hoped that a productive service will result. This new route will need to be closely monitored to see what adjustments may be warranted. Service will be offered every 30 minutes peak and every 60 minutes midday and Saturday.

3.6.1.3 *Premium Corridor Service Levels*

By the end of FY 2015, the Premium Corridor concept will be more fully implemented. The corridor service is anticipated to include the following. The check mark shows the now three corridors that meet or mostly meet the premium service levels of 15 minutes peak, and 30 minutes midday, Saturday, and Sunday.

- Capital Boulevard – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30

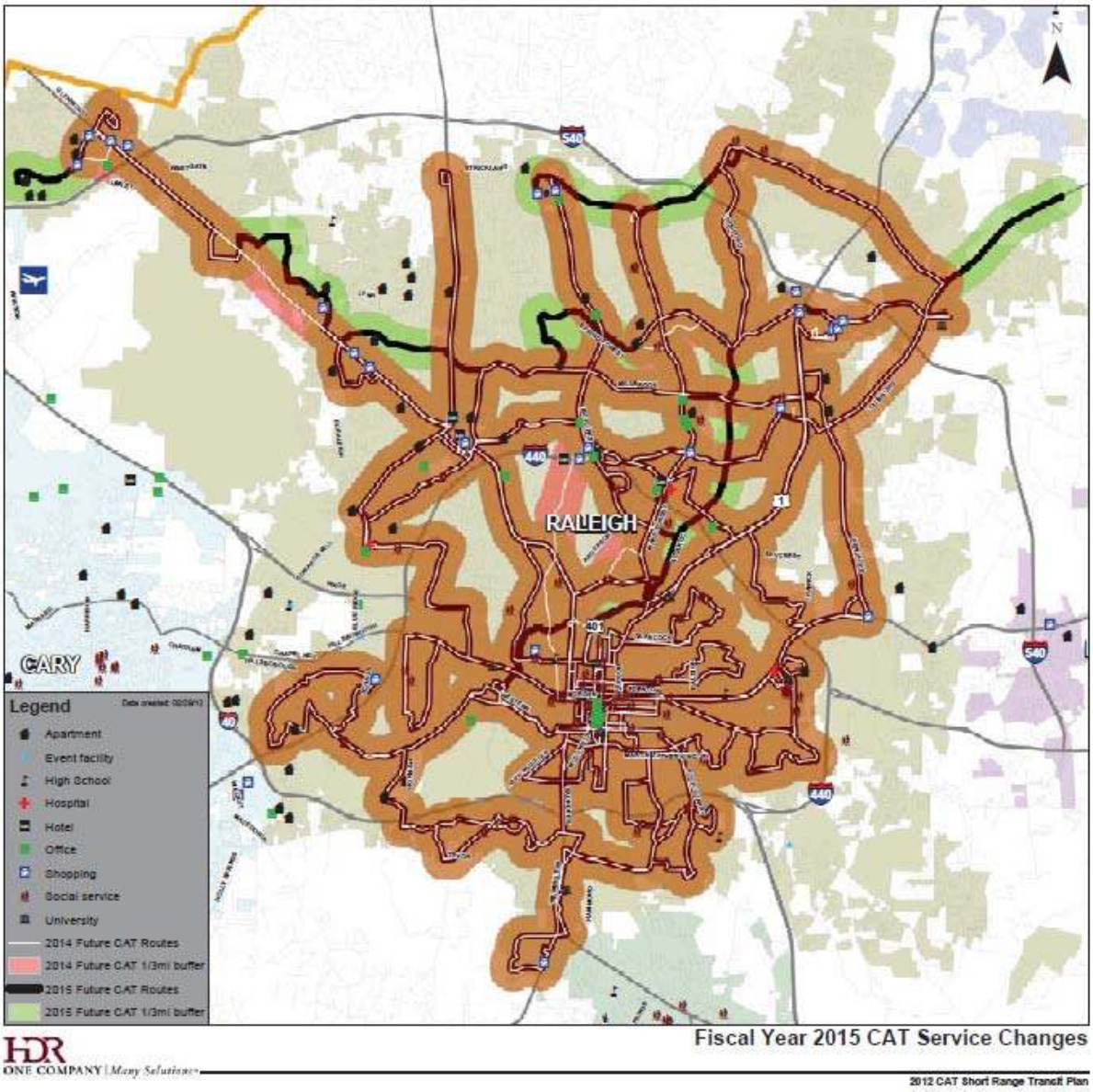
minutes, and Sunday headways at 30 minutes. The corridor also gets capital improvements to the streetside elements and a new transfer center/park & ride lot (see capital projects section).

- New Bern Avenue – service provided seven days per week with peak headways at 15 minutes, midday headways at 15 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. Service levels are extended out to the New Bern Walmart. The corridor has in place the improvements to the streetside elements.
- Rock Quarry Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes.
- South Saunders street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes.
- Avent Ferry Road – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are on the portion of the corridor between NC State and Avent Ferry & Gorman and are achieved though staggered schedules on the 11 Avent Ferry and 11C Buck Jones Connector. The portion of the corridor into downtown has half this service level.
- Hillsborough street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. These service levels are on the portion of the corridor between downtown and Dixie Trail and are achieved though staggered schedules on the 4 Rex Hospital and 12 Method.
- Glenwood Avenue/Oberlin Road – service provided between downtown and Crabtree Valley Mall seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are only between downtown and the mall and are achieved though staggered schedules on the 6 Crabtree and 16 Oberlin. Since the routes follow different paths between the two ends, the high frequency is only on between the two main destinations. New improvements are made to the Crabtree Valley Mall Transit Center (see capital projects section).
- Six Forks Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. Continuous service along the entire corridor is now in place.
- Falls of Neuse Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. The route now operates along the full length of the Falls of Neuse premium corridor.

3.6.2 Summary

Exhibit 3-12 shows the systemwide changes in the route coverage for FY 2015 compared to the FY 2014 service coverage. The increases in service coverage are from the new Durant/Strickland Crosstown, Spring Forest Crosstown, and Umstead Crosstown. The underutilized area losing service are along US 70/Glenwood from the 70e Brier Creek, and the relocation of the 8 Northclift from Lassiter Mill.

Exhibit 3-12
FY 2015 Systemwide Service Coverage Changes



3.6.3 Capital Improvements

To support the service changes, several new or improved capital facilities are recommended. In addition, more buses will need to be purchased to provide the expanded services.

3.6.3.1 *Triangle Town Center Park & Ride/Transit Center*

With the changes occurring in FY 2015, the Triangle Town Center becomes a new focal point for CAT service. At the end of FY 2015, the 1 Capital, New Hope Crosstown, Spring Forest Crosstown, Wake Forest Circulator, and TTA's WRX Wake Forest-Raleigh Express all connect at the mall. The *2040 Capital Area Bus Transit Development Plan* identifies this location as a park & ride location for commuter service to both downtown Raleigh and the Research Triangle Park, and TTA's long range plans call for the possible creation of a light rail station in this area.

With all of this activity, an improved transit facility is warranted. During FY 2015, a combination transit center and park & ride lot should be constructed. This facility should have a centralized boarding platform for buses, overhead shelter, operator restrooms, passenger amenities, and real-time information displays. Sufficient parking should be provided to meet anticipated demand for bus services and the potential rail service, conceptually around 600 spaces or more. Additionally, this facility should be located where the future light rail service can easily access it. Ideally, the site will be within easy walking distance to major destinations in the area, such as the mall or the other major retail centers nearby. If riders can get off their bus at the transit center and walk to their destination, usage levels will be much higher. CAT is responsible for the construction of the transit center, and TTA is responsible for the construction of the parking.

3.6.3.2 *Capital Boulevard Premium Transit Corridor Amenities*

In FY 2015, the second of the premium transit corridors is schedule to receive a comprehensive upgrade of the streetside amenities. Capital Boulevard has been selected as the second corridor since it has the second highest ridership of any of the nine corridors.

The program of projects for the corridor has not been determined, but are anticipated to include:

- Sidewalks along the length of the corridor on both sides of the street
- Sidewalk connections off the corridor to significant destinations, such as the multiple retail centers and office areas like Highwoods
- Enhanced amenities at stops, including larger shelters, benches, and real-time information displays
- Minor capital improvements to facilitate bus operations, such as signal timing, queue-jumper lanes at intersections, and other low-cost items

- Additional consideration needs to be given to pedestrian crossings and stop locations. As an extremely busy and often fast moving US highway, safe design for pedestrian crossings are more critical along this corridor than some others. Bus stops should be located to encourage use of the signalized crossings and minimizing the temptation to jaywalk (or run) across traffic.

The final program of projects will be determined based upon the conditions at the time and feedback from riders, operators, property owners, and city staff.

3.6.3.3 *Crabtree Valley Mall Transit Center Upgrades*

Unlike the Moore Square Transit Center that had few upgrades over the years, the Crabtree Valley Mall Transit Center was completely redone in recent years when the new parking deck was constructed in front of Belks. The resulting facility is very attractive and highly convenient to the mall; the mall interior can be reach with a short walk completely under cover. A more ideal location could not have been selected.

A few upgrades are warranted, however. In particular, the addition of an operator restroom, not open to the general public, would be welcomed. The mall restrooms are not nearby, and operators are unable to have a break due to the time they would have to leave their bus unattended.

Additional passenger amenities may also be desirable. One potential would be to work with the mall and see if any creative way to add retail space that is easily accessible from the platform can be found. A convenience store/coffee/donut shop would be a desirable addition.

3.6.3.4 *Miscellaneous Capital Improvements*

The miscellaneous capital improvement program identified in the *2040 Capital Area Bus Transit Development Plan* will continue in FY 2015.

3.7 FY 2016 Service and Capital Changes

The service changes for FY 2016 continue the themes of the previous years – implementing additional service along the premium transit corridors, and implementing new crosstown service to improve mobility throughout the city.

3.7.1 Service Changes

3.7.1.1 *Hillsborough Street Area Improvements*

The *2040 Capital Area Bus Transit Development Plan* identified Hillsborough Street as a premium transit corridor from downtown Raleigh to downtown Cary. This corridor duplicates the potential commuter rail and light rail corridors to some extent, but bus service along this corridor will help build the travel

patterns in advance of the rail and serve as a collector/distributor service for people destined away from a rail station.

The previous years' service changes have partially implemented the premium transit corridor service, but only on the segment between downtown Raleigh and NC State. The portion of the corridor between NC State and downtown Cary does not have local bus service. In FY 2016, this gap is filled with the introduction of the Chatham route. This route will originate in downtown Raleigh and follow Hillsborough Street past the Fairgrounds to Chatham Street and to the downtown Cary Train Station. Service will be offered every 30 minutes during peaks, and hourly midday, Saturday, and Sunday.

A new crosstown route is also implemented along part of this corridor. The Blue Ridge Crosstown will operate between downtown Cary and the Town North Shopping Center on Creedmoor. It will travel Chapel Hill Road, Corporate Center Drive, Trinity Road past the RBC Center, Blue Ridge Road past the NC Art Museum and Rex Hospital, Edwards Mill Road, through the Crabtree Mall Transit Center, and north on Creedmoor to the current end-of-the-line on the 4 Rex Hospital. With the introduction of this route, the 4 Rex Hospital becomes a much shorter route, terminating at Rex Hospital. The Blue Ridge Crosstown will provide service every 30 minutes peak and hourly midday and on Saturdays.

3.7.1.2 *Avent Ferry Area Improvements*

The 11 Avent Ferry will be rerouted from its current service on Lineberry Road to become a connection to Crossroads Plaza in Cary. This extension will be via Gorman Street, Tryon Road, and Dillard Drive. This change provides another connection point between CAT and CTran routes, and will allow NC State students to directly reach Crossroads. It will also provide another opportunity for Cary residents to travel directly to NC State and downtown Raleigh. Along with this change, the 11 Avent Ferry gains the full premium transit schedule of every 15 minutes during peaks and every 30 minutes during midday, Saturday, and Sunday. This increase doubles the amount of service on the 11.

The 11C Buck Jones Connector gets merged with the 7C Carolina Pines/Rush Connector and forms the new South Crosstown. This crosstown originates at Sanderford & Rock Quarry, and follows the 7C Carolina Pines/Rush Connector route to Lake Wheeler Road. From there, the route continues west along Lineberry Road, taking over for the 11 Avent Ferry route, and continues over the 11 Avent Ferry route to Gorman & Avent Ferry. At this point, the route follows the 11C Buck Jones Connector along Athens Drive to Jones Franklin, and travels north on Jones Franklin to terminate at the Plaza West Shopping Center, where it connects with TTA service and the 6 Buck Jones CTran route. Service will be provided every 30 minutes peak, and hourly midday, Saturday, and Sunday.

The South Crosstown provides a continuous service along the south side of Raleigh. While new travel patterns outside of downtown are now possible, a few areas lose service or have their service changed. In the Crosslink area, route changes will need to be coordinated with adjustments to the 5 Biltmore Hills

to ensure that all major stops continue to have service. For residents in the Lineberry area, a transfer to reach NC State will be required. Residents in some of the areas at the end-of-the-line loop on the 11C Buck Jones Connector will lose service, primarily along Ft. Sumpter/Dana Drive and Schaub/Derby areas. Ridership in these areas are low and most stops being abandoned are within a 5-10 minute walk of service on Athens Drive, Jones Franklin Road, Buck Jones Road, or Western Boulevard. This route will provide enhanced transfer opportunities with the new transfer facilities at Pecan & Wilmington and Gorman & Avent Ferry. These facilities are discussed in the capital projects section.

At the time of these changes, the 21 Caraleigh should be adjusted to provide two-way service on South Fayetteville Street, Maywood Avenue, and Lake Wheeler. The route should be extended to Lake Wheeler & Tryon at a minimum. A further extension may be required to find a suitable turnaround for the bus. With these changes, greater mobility is provided for residents of Walnut Terrace, the Farmers' Market, and the apartment complexes at Tryon Road. This change will remove service from the area of the old CAT maintenance facility, but with the additional stops provided earlier on the 40e Wake Tech Express, service will be in close proximity to the few riders remaining in the area.

3.7.1.3 *Rock Quarry Area Improvements*

The 5 Biltmore Hills route along Rock Quarry Road will be adjusted to provide continuous service along a longer stretch of the roadway. At the outer end, the route will be extended southeast to the vicinity of Battle Bridge Road. The limits of the extension will be based upon the amount of development along the corridor in FY 2016.

Operation of the end-of-the-line loop requires further examination. The current operation along Sanderford, Crosslink, and other roadways will not continue on the 5 Biltmore Hills due to the travel time impacts, but these roadways are unlikely to be completely abandoned. One option is to extend the 22 State Street to take over the current end-of-line loop on the 5 Biltmore Hills, but this option would require service to be removed from Peterson, Garner Road, and Newcombe, but the few riders in this area will have service within a 5-10 minute walk. This rerouting may require the introduction of the new Garner Road route or the Garner-Wake Med Crosstown included in the *2040 Capital Area Bus Transit Development Plan*. Further input from the community will be required during the implementation planning.

Approaching downtown, the route will be modified to continue north to New Bern Avenue and then west to downtown following the same route as the 15 Wake Med. The extension to New Bern will provide more accessibility on the east side of downtown and will allow the route to take advantage of the premium transit corridor improvements along New Bern.

Service will be provided every 30 minutes peak and hourly midday, Saturday, and Sunday.

3.7.1.4 *New Bern/Wake Med Area Improvements*

As indicated in the capital section below, the Wake Med Hospital area is scheduled to have a transit center constructed in FY 2016. This transit center will create a major focal point for routes on the eastern side of Raleigh. To maximize the potential connections and benefits to riders, several routes will be adjusted to provide connections.

The 3 Glascock and 10 Longview routes operate on the north side of New Bern Avenue and terminate near Wake Med. Neither of these routes, however, go to Wake Med leaving this entire corner of northeast Raleigh disconnected from destinations in their immediate area. In order to improve the connections, when the new transit center opens, both routes will be extended to terminate at the transit center. The routing will use Milburnie and Peartree for a portion of the extension, but the final routing will need to be determined in close coordination with the area residents and will be dependent upon where the transit center is located. With these changes, the 31 New Hope Commons Sunday only service can be eliminated and Sunday service added to either the 3 Glascock or 10 Longview.

Further out on New Bern Avenue, the 18 Worthdale will be extended to terminate at the New Bern Walmart transfer center. This extension will be via Poole Road, past the CAT operating facility, and north on New Hope Road and Rogers Lane, to west on New Bern Avenue to the Walmart. With this extension, the 15 Wake Med, 18 Worthdale, and 45 New Hope Crosstown will all connect.

3.7.1.5 *R-Line Improvements*

Included in the FY 2016 service program is the addition of a second R-Line route. The current R-Line provides good geographic coverage of the downtown and Glenwood South areas, but requires riders to go around a one-way loop. With the addition of a second R-Line, this out-of-direction travel can be eliminated. The "second" R-Line could be another route, with a redesign of the current service, or could be the operation of a clockwise service to complement the existing counterclockwise operation. This second route will provide a critical connection between Moore Square and the new Union Station being planned to serve Amtrak and the future high speed rail. Funds have been included in the budget to allow for this additional service, but the most appropriate routing will need to be determined in close cooperation with the Downtown Raleigh Association and other interests.

3.7.1.6 *Premium Corridor Service Levels*

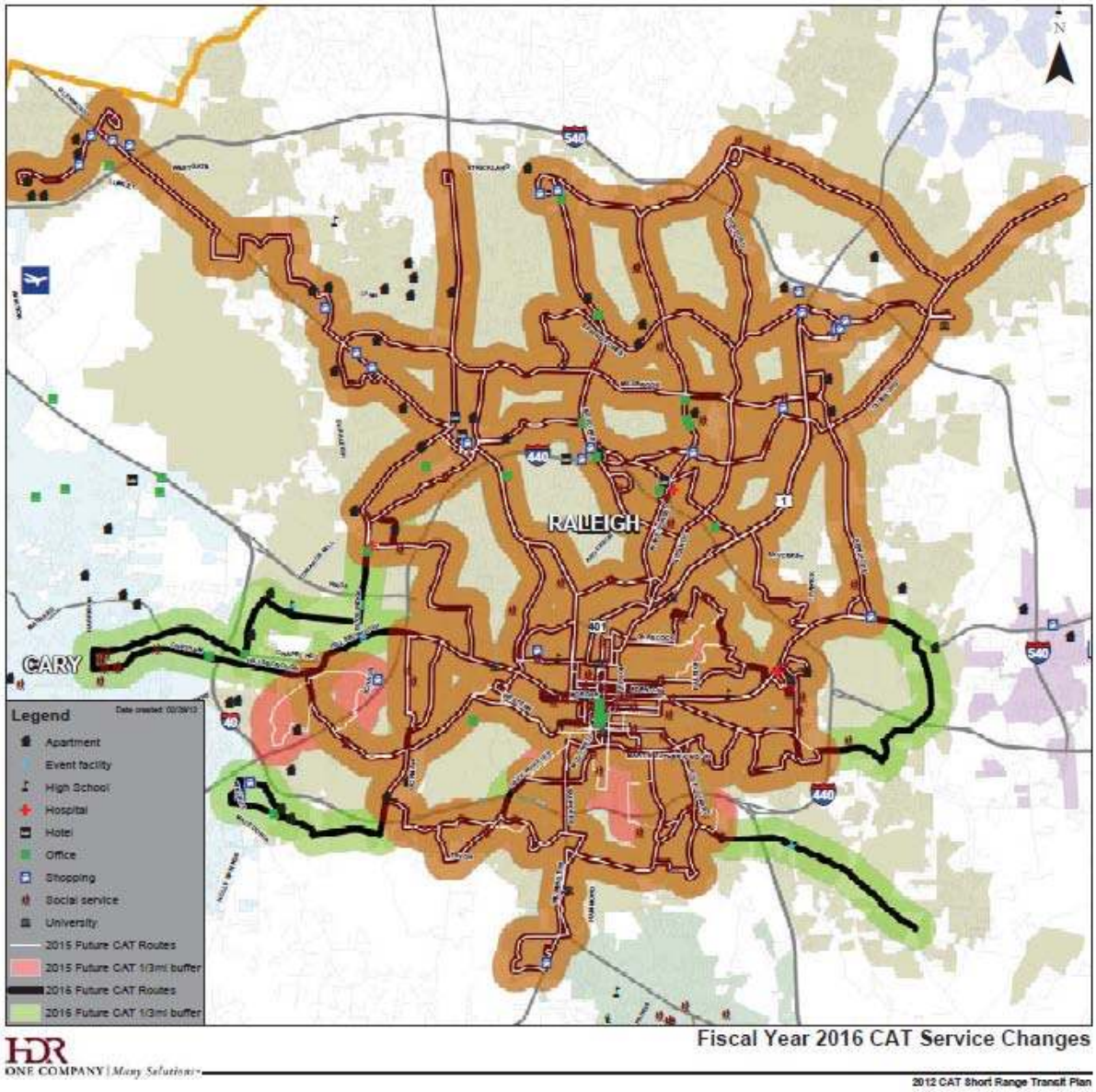
By the end of FY 2016, the Premium Corridor concept will be more fully implemented. The corridor service is anticipated to include the following. The check mark shows the now three corridors that meet or mostly meet the premium service levels of 15 minutes peak, and 30 minutes midday, Saturday, and Sunday.

- Capital Boulevard – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. The corridor streetside improvements are in place.
- New Bern Avenue – service provided seven days per week with peak headways at 15 minutes, midday headways at 15 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. The corridor streetside improvements are in place.
- Rock Quarry Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. The route has been extended along the length of its corridor.
- South Saunders street – service provided seven days per week with service levels brought up to the premium corridor standards of peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes.
- Avent Ferry Road – service provided seven days per week with service levels brought up to the premium corridor standards of peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. Service has been extended all the way to Crossroads.
- Hillsborough street – service provided seven days per week. Along the inner portion, peak headways are 15 minutes, midday headways are 30 minutes, Saturday headways are 30 minutes, and Sunday headways are 30 minutes though staggered schedules on the 4 Rex Hospital and 12 Method. Service has been added at half these levels from NC State to downtown Cary.
- Glenwood Avenue/Oberlin Road – service provided between downtown and Crabtree Valley Mall seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are only between downtown and the mall and are achieved though staggered schedules on the 6 Crabtree and 16 Oberlin. Since the routes follow different paths between the two ends, the high frequency is only on between the two main destinations.
- Six Forks Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. Service is now continuous along the entire length of the corridor.
- Falls of Neuse Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. Continuous service along the corridor is in place.

3.7.2 Summary

Exhibit 3-13 shows the systemwide changes in the route coverage for FY 2016 compared to the FY 2015 service coverage. The increases in service coverage are from the extension of the 18 Worthdale, 5 Biltmore Hills, 11 Avent Ferry, the new Chatham route, and the new Blue Ridge Crosstown. The underutilized areas losing service coverage are a small portion of the 22 State Street area and a portion of the 11C Buck Jones Connector. This latter loss is not as bad as shown since the CTran Route 6 Buck Jones covers this area.

Exhibit 3-13
FY 2016 Systemwide Service Coverage Changes



3.7.3 Capital Improvements

3.7.3.1 *Wake Med Transit Center*

Wake Med is the second busiest transit center after downtown. The level of activity already in place, the need to provide improved transfer facilities and operator layover space, and the increasing amount of service in the plan all lead to a critical need to provide better transit facilities.

The need for the transit center exists today, but its construction has been delayed until FY 2016 to allow time for funding to become available and to determine the most appropriate location in consultation with Wake Med as they update their campus plan. The transit center should be located off-street, include a central boarding platform, provide shelter for passengers as they wait and board buses, provide passenger amenities, and have an operator restroom. The transit center should be located such that riders have a short and preferably covered access into the hospital's building complex, and other related medical and Wake County facilities in the area.

This transit center will be used by the 3 Glascock, 10 Longview, 15 Wake Med, 19 Apollo Heights, and 50 Northeast Crosstown. The *2040 Capital Area Bus Transit Development Plan* recommends that the Triangle Transit commuter bus service along US 64 also stop at the facility en route to downtown. Wake Med is one of only four locations that charges for parking, and is likely to have demand from work commuters.

3.7.3.2 *Pecan & Wilmington Transit Center*

The Pecan & Wilmington/S. Saunders area is currently a major transfer location for CAT with numerous riders connecting between the 7 S. Saunders and 7C Carolina Pines/Rush Connector. Even though it is only two routes, it is the 7th busiest location in the CAT system, with 450 boardings and 359 alightings. This area is also being considered for a future Commuter Rail station as part of the studies underway by Triangle Transit.

Funding has been included in FY 2016 for construction of a new transit center in this general area that can transition to also being a commuter rail station/park & ride lot. As such, the transit center should be located adjacent to the railroad, but in a location where the 7 S. Saunders and 7C Carolina Pines/Rush Connector routes can easily access. The bus routes and commuter rail service will complement one another, with commuter rail serving the longer distance work commuters and the bus service providing the local area connections.

3.7.3.3 *Gorman & Avent Ferry Transit Center*

The Gorman & Avent Ferry area is another busy location for existing CAT service, with about 200 boardings and alightings each. With the changes to extend the 7C Carolina Pines/Rush Connector

and 11 Avent Ferry routes, this location will become even busier. A transit center at this location would serve these two routes, plus the 12 Method, which would be extended, and the Wolfline routes in the area. It could also service as a peripheral park & ride for Wolfline to encourage students not to bring their cars to campus. CAT would be financially responsible for the transit center elements and NC State would be responsible for the provision of the park & ride.

3.7.3.4 *Miscellaneous Capital Improvements*

The miscellaneous capital improvement program identified in the *2040 Capital Area Bus Transit Development Plan* will continue in FY 2016.

3.8 Renumbering & Renaming

Separate from the annual service changes described in the previous sections, CAT should evaluate the names and numbers assigned to the bus routes. Names and numbers should quickly communicate to existing and new users the important characteristics of a bus route – where it goes, whether it is a major route or a lesser route, and any unusual operating characteristics, such as operating non-stop or peak hours only.

A combination of numbers and names are recommended. Studies have shown that some people remember numbers and other remember names. Using a simple combination of both appeals to different people.

The Triangle region as a whole is also struggling with how to name/number routes in a regional context. For example, should there be only one "route 1", or can each city duplicate numbers? The transit agencies continue to meet on this topic.

3.9 Marketing

A key and often overlooked aspect of any transit program is to market the system to existing and potential users. As with any consumer product or service, usage is first dependent upon letting customers know it exists.

Marketing is not just "advertising." A successful program involves (in order):

- Product
- Place
- Price
- Promotion

This document describes the "product," that is the bus services being made available for use, and the place they are being provided. Price (aka, the fare) is not addressed in this document, but has been

addressed in the *2040 Capital Area Bus Transit Development Plan*. The "promotion" consists of everything associated with creating an identity for the bus system and publicizing it to the community.

The best way to distinguish between advertising and marketing is to think of marketing as a pie, inside that pie you have slices of advertising, market research, media planning, public relations, product pricing, distribution, customer support, sales strategy, and community involvement. Advertising only equals one piece of the pie in the strategy. All of these elements must not only work independently but they also must work together towards the bigger goal.[6] Marketing is everything that CAT can do to encourage more people to take the bus.

As a general guideline, a marketing program should amount to 3-8% of the operating budget. For systems that are in a maintenance mode, that is not doing many service changes, but needing to keep the system in the forefront of people's minds, a 3% expenditure is appropriate. For systems that are undertaking a significant change, a level of 5% is better. When a system is undertaking a major rebranding program that involves changing the image of the service and promoting major changes, a level of about 8% is desirable. The financial calculations for the 2012 CAT Short Range Transit Plan have assumed the middle level – 5%. A higher expenditure is more appropriate and is even critical to promote the significant changes associated with the rail program, but these changes are likely to be included as part of the overall regional transit budget. In the meantime, CAT is undertaking some significant enhancements of its own, and a minimum level of 5% of the operating budget is desirable.

[6] See Lake, Laura. *Marketing vs. Advertising: What's the Difference?* http://marketing.about.com/cs/advertising/a/marketvsad.htm.

4 Financial Summary

The financial calculations for the *2012 CAT Short Range Transit Plan* take into account the cost for capital improvements and estimates of the additional hours of service per year. Costs are preliminary and will need to be refined as the schedules are prepared for each individual route and locations and design for the capital projects are determined. Detailed spreadsheets have been developed showing the cost calculations.

All costs are expressed in current (2011) year dollars (no allowance for inflation).

4.1 Operating Costs

Operating costs were estimated by determining the annual increase in hours required to bring existing routes up to the recommended service standard and for the additional revenue hours required for the new routes. A cost-per-hour amount was applied to the additional service hours to determine annual costs, based on an annualization factor of 251 weekday service days, plus 56 Saturdays and 56 Sundays to determine total annual costs. The cost-per-hour was based upon the 2009 cost-per-revenue-hour for CAT as reported in the National Transit Database. **Exhibit 4-1** shows the annual increment in the operating costs. The FY 2013 incremental savings is estimated to be $17,000; for all practical purposes, this represents no change in the operating costs.

The slow build up to the operating expenses has been deliberate. This buildup allows time for the receipt of additional funding to occur, and allows the impacts of the previous year's changes to be evaluated. The initial year of the program will result in a dramatically different route structure, which should have time to be evaluated before major new changes are introduced. By the end of this short-term plan, CAT will have in place a robust system to support the introduction of rail technologies. Should rail be delayed, the bus network alone will provide substantially more mobility than does the current bus system.

Exhibit 4-1
Incremental Operating Costs

FISCAL YEAR	INCREMENTAL OPERATING COSTS
FY 2013	$0.0 million
FY 2014	$1.4 million
FY 2015	$2.0 million
FY 2016	$8.1 million

4.2 Capital Costs

Costs for the *2012 CAT Short Range Transit Plan* were estimated for capital items by determining the unit cost for each type of improvement and multiplying by the number of units. Estimated costs for transit capital items, such as buses, transit centers, and streetscape improvements, were determined based on similar past costs from CAT as well as from projects across the United States. Capital cost estimates include fixed capital items along with estimated expenses for rolling stock such as spare vehicles. **Exhibit 4-2** shows the costs by facility type.

The costs shown for the Triangle Town Center facility are those for just the bus transit center. The *2040 Capital Area Bus Transit Development Plan* also included costs for 940 parking spaces for initial use as commuter bus spaces, transitioning to a rail park & ride facility. These costs are related to the commuter transit network provided by Triangle Transit and have not been included in the CAT expenses. The costs associated with the additional parking are estimated to be around $11.6 million, which includes costs for design and contingency.

Exhibit 4-2
Capital Facility Enhancements

CAPITAL ITEM	UNIT	COST	HORIZON
Transit Centers	# Bays		
New Bern Walmart	4	$ 880,000	2014
Moore Square Renovation		$ 3,500,000	2014
Triangle Town Center w/rail	8	$ 3,200,000	2015
Crabtree Renovation		$ 250,000	2015
Wake Med Transit Center	8	$ 5,120,000	2016
Avent Ferry & Gorman	4	$ 880,000	2016
Wilmington & Pecan (SE Raleigh)	4	$ 880,000	2016
Premium Transit Corridors	# Miles		
New Bern Avenue	4.6	$ 2,430,000	2014
Capital Boulevard	8.7	$ 4,600,000	2015
Buses (includes spares)	Vehicles		
Service expansion	12	$ 5,000,000	2013-16
New services	37	$ 15,100,000	2013-16
Paratransit	4	$ 250,000	2013-16
Streetside			
Sidewalks	40 miles	$ 6,800,000	2013-16
Bus Stops - Sign only	400	$ 80,000	2013-16
Bus Stops - Benches	60	$ 180,000	2013-16
Bus Stops - Shelters	40	$ 640,000	2013-16
Soft Costs			
Engineering, Design, Construction Management		$ 8,820,000	2013-16
Contingency (35%)		$ 20,500,000	
TOTAL		**$ 79,000,000**	

4.3 Potential Funding Sources

As noted earlier, funding for the service expansion beginning in FY 2014 is uncertain. A funding plan has not been prepared for this short term plan. Rather, the funding requirements have been incorporated into the overall Wake County Transit Plan, which includes funding analyses for the Triangle Transit rail program. Since the principal additional funding source is likely to be the countywide dedicated sales tax, the overall transit needs in the county is the appropriate venue to develop the funding plan.

A long term transportation authorization bill to replace SAFETEA-LU is several years overdue, with current funding levels and programs merely being extended on a short term basis. Under the current rules, Raleigh may well see a sizable increase in funding for the formula programs, since this is primarily appropriated on the basis of population. The baseline is adjusted every 10 years following the Census, and with the 46 percent growth in Raleigh's population from 276,000 to 404,000 from 2000 to 2010, additional federal money would occur under the current program. However, there are also funding bills progressing through Congress that would change the rules and dramatically reduce all transit funding.

Greater certainty will be possible following this November's elections, at the federal and state levels. It will also be known whether or not Wake County will hold a sales tax referendum and whether it passes. A firm funding plan can be developed during FY 2013.

Should the countywide sales tax not be implemented or the federal programs be cut back, the costs for the Raleigh-only service expansion in this document will serve as guidance to the Raleigh City Council and Raleigh Transit Authority Board on whether and how much additional funding and service expansion is appropriate for Raleigh to undertake.

4.4 Job Creation Effect

One of the many benefits associated with investments made in public transportation is the potential for job creation. Based on APTA's 2009 methodology, assessing the jobs impact of all national spending on public transportation results in 29% being captured by capital spending and 71% captured by operations spending of jobs.

Exhibit 4-3 outlines a breakdown of these jobs, distinguishing categories of direct jobs (public transportation manufacturing/construction and operations jobs), indirect jobs (jobs at suppliers of parts and services), and induced jobs (jobs supported by workers re-spending their wages).

Exhibit 4-3
Estimated Job Creation

Category	Jobs
Capital	
Direct Jobs	648
Indirect Jobs	622
Induced Jobs	609
TOTAL	**1,880**
Operating	
Direct Jobs	322
Indirect Jobs	45
Induced Jobs	258
TOTAL	**625**

An estimated 2500 people would gain employment by the implementation of the 2012 CAT Short Range Transit Plan. This employment level does not include riders who would gain access to jobs and be able to become or remain gainfully employed.

APPENDICES

TECHNICAL MEMORANDUM #1
2010 Capital Area Bus Transit Rider Survey

TECHNICAL MEMORANDUM #1

From: HDR Engineering, Inc. of the Carolinas Consulting Team (HDR)

To: Capital Area Bus Transit Development Plan Steering Committee & CAMPO Technical Coordinating Committee

Date: September 22, 2011

Topic: 2010 Capital Area Bus Transit Rider Survey

1 Introduction

A key component of the Capital Area Bus Transit Development Plan involved administering an Origin/Destination (O/D) rider survey to users of Capital Area Transit (CAT), Cary Transit (CTran), Triangle Transit (TTA), and the North Carolina State University Wolfline (Wolfline). The survey was developed in order to gain additional insights into riders' travel, demographic, and attitudinal characteristics. The results from the survey will be used in crafting the final recommendations of the Capital Area Bus Transit Development Plan. Additionally, origin and destination location information will be used in updating the Triangle Regional Model.

2 Methodology

Four separate questionnaires were developed respectively for CAT, CTran, Triangle Transit, and Wolfline services. HDR developed the initial questionnaires which were subsequently approved prior to distribution by the Capital Area Transit Development Plan Steering Committee. The survey questionnaires were identical for CAT and CTran, with the exception that each jurisdiction included local examples for the locational questions (such as providing local intersections or place names). The TTA survey was mostly the same, but included slightly different wording on the fare question, and a different set of attribute questions. The scale of the attribute rankings was also different, with CAT and CTran using a five-point scale and TTA using a seven-point scale. TTA's 2009 survey used a seven-point scale and they desired to maintain the same scale for continuity.

Besides the different attribute scale and questions, CAT and CTran included two questions related to amenities at bus stops and the willingness to walk further to have access to amenities. These questions were added at the request of the Center for Urban Affairs & Community Services at North Carolina State, which was doing a study of mass transit use and attitudes toward transit use. An additional question asked on the CAT and CTran surveys was the riders' preferred method of receiving information. The TTA survey included two unique questions instead that asked about how riders would rate the August 2010 service changes and whether they would take the new bus route to the RDU airport. The Wolfline survey was an abbreviated survey that asked about 15 questions instead of the 40 or so questions on the other surveys. The reason for this difference was due to the length of time riders spent

on the Wolfline service. These routes are shorter and can be crowded, which diminishes the time and willingness to complete a robust survey instrument. A separate attitudinal survey on Wolfline services was being planned, which eliminated the need to ask these questions as well.

Planning Communities, LLC (PCL) translated each survey instrument into Spanish. AJM Consulting (AJM) was responsible for survey distribution through a workforce of survey administrators and the subsequent data entry of all received survey responses.

A survey pre-test was performed on a sample of CAT routes in the middle of September 2010. About 670 surveys were distributed with 127 surveys returned for a 19% response rate. Of particular concern was the length of the surveys and whether the wording of the questions was clear. There was no observed decrease in the response rate for the last questions compared with the first, indicating that "survey fatigue" was not an issue. Some wording was clarified based upon comments from riders taking the survey, but no major changes were made.

For the actual survey, all survey administrators were trained. Final O/D rider surveys were administered on-board CAT, CTran, Triangle Transit, and Wolfline routes between October 29, 2010 and November 4, 2010. A sample of runs was chosen with service hours surveyed based on random selection stratified so that all routes of interest were surveyed. Only weekdays were sampled on all four systems. AJM survey administrators accompanied operators along fixed-routes for the full duration of the route run. Survey administrators were instructed to give all riders who boarded the bus during the route run a questionnaire. All participants were provided a pencil to fill out the survey. Completed forms were returned to the surveyor who placed the surveys in an envelop denoting the route and run number. No mail back option was provided. Past experience at multiple properties have shown that few people take advantage of this option and many who do do not correctly fill out the survey form to reflect the trip on which they received it. Since space on the form was already limited, the Capital Area Transit Development Plan Steering Committee agreed that the mailback option was not required. Survey forms are located at the end of this memorandum.

Separate surveys were available in Spanish. A separate instrument was selected rather than having the translation on the English survey due to space constraints. Surveyors were instructed to distribute a Spanish language survey on request. The number of Spanish surveys received back were 35 on CAT, 9 on CTran, and 7 on Triangle Transit.

The survey goal was to achieve a 90% confidence level +/- 10% for the CAT daytime local routes individually and for the off-hour and express routes as groups. These accuracy levels were also desired for the individual TTA and Wolfline surveyed routes and for the CTran routes as a group. Achieving these accuracy levels was tempered by the budget available.

These accuracy levels were met on most CAT daytime, TTA, and Wolfline surveyed routes. For CAT daytime routes, the exceptions were Route 3 Glascock, Route 10 Longview, Route 19 Apollo Heights, Route 21 Caraleigh, Route 8C Sawmill, Route 11C Buck Jones, Route 23C Millbrook, and Route 24C North Crosstown. For TTA, the exceptions were Route 303 and Route 305 while two Wolfline routes, Route 2 and the Werewolf, had a sampling error above 10%. The grouped routes, including the off-hour CAT and CTran routes each possessed sampling errors below 10%. The grouped commuter express CAT routes had a sampling error that was only slightly above the 10% threshold.

2.1 CAT O/D Rider Survey

The CAT on-board O/D rider survey was administered on November 1, 2010 and November 2, 2010. Several Triangle Transit routes, including the Wake Forest Express, Knightdale Express, and Zebulon Express, are included as they are operated by CAT. The R-Line, Route 40E, Route 31 (Sunday only), Route 34 (Sunday only), and the Wake Forest Loop were not surveyed. Both the R-Line (the downtown free circulator) and the 40E Wake Tech Express serve specialized markets, and the Wake Forest Loop is a contracted service to the Town of Wake Forest. For budgetary reasons, these routes were not surveyed. For the CAT system as a whole, a total of 2,131 responses were received. CAT systemwide average daily ridership for the surveyed routes is estimated to be 16,569 boardings, which is based on total ridership figures for fiscal year (FY) 2009-2010. Overall, this sample size is accurate at the 90% confidence level, plus or minus 1.7% for systemwide statistics.

Beyond the CAT systemwide statistics, sampling response rates and accuracy levels is observable by each surveyed route. **Exhibit 2-1** provides an overview of all sampled CAT routes, showing the average FY 2009-2010 weekday ridership, total responses received by route, and the sampling error percentage. CAT routes whose sampling error exceeds +/- 10% are highlighted in red. The majority of highlighted routes represent off-hour services, with operating hours in the early-morning and late-evening. However, taking the off-hour routes as a whole, the sampling error decreases to 5%.

A sampling factor is calculated for each route in order to expand the total route sample responses to the overall system as a whole. Doing so controls for different response rates on the various routes, so that the overall system results properly reflect the relative ridership proportions for each route. CAT ridership data from fiscal year 2009-2010 provides the average weekday passenger boardings for each route. The total route sample provides the number of returned CAT O/D rider surveys by route. By dividing the total route sample by the average number of weekday boardings, a unique control factor is obtained for each route. This factor is applied to each response, by route, in order to equal the number of average daily weekday boardings.

Exhibit 2-1
Sampled CAT Routes

Route	Average Weekday Ridership	Total Route Responses	Sampling Factor	Sampling Error % - 90% Confidence
CAT Daytime Local Routes				
1 Capital	1,749	104	16.820	7.8
2 Falls of Neuse	986	193	5.109	5.2
3 Glascock	290	40	7.253	12.0
4 Rex Hospital	1,010	171	5.906	5.7
5 Biltmore Hills	573	62	9.240	9.8
6 Crabtree	707	66	10.717	9.6
7 South Saunders	1,076	109	9.874	7.4
8 Northclift	438	68	6.441	9.1
10 Longview	393	42	9.349	11.9
11 Avent Ferry	835	99	8.434	7.7
12 Method	770	102	7.551	7.5

Route	Average Weekday Ridership	Total Route Responses	Sampling Factor	Sampling Error % - 90% Confidence
13 Chavis Heights	286	63	4.536	9.1
15 WakeMed	1,938	73	26.544	9.5
16 Oberlin Road	517	72	7.175	8.9
18 Worthdale	508	72	7.057	8.9
19 Apollo Heights	353	24	14.721	16.1
21 Caraleigh	484	23	21.056	16.7
22 State Street	397	114	3.483	6.4
Route 7C Carolina Pines	362	114	3.176	6.3
Route 8C Sawmill	183	40	4.566	11.4
Route 11C Buck Jones	289	24	12.059	16.0
Route 15C Trawick	638	109	5.848	7.1
Route 23C Millbrook	267	51	5.229	10.3
Route 24C North Crosstown	306	6	51.002	33.4
Route 25C Triangle Town Ctr.	307	64	4.791	9.1
TOTAL	15,662	1,905	8.221	1.7
CAT Off-Hour Routes				
26c Early East	8	3	2.755	40.3
28 Southwest	15	2	7.640	55.9
29c North Night	41	22	1.878	12.1
30 Northeast	50	4	12.379	39.7
32 Sanderford Road	103	35	2.942	11.3
33c Glenwood	29	11	2.604	19.7
35 Poole Road	92	37	2.482	10.4
36 Garner Station	153	10	15.337	25.1
37 North Hills	67	1	66.834	82.0
38 Blue Ridge	88	30	2.917	12.2
39 Cameron Village	68	22	3.101	14.4
TOTAL	714	203	3.5172	4.8
CAT Commuter Express				
Route 70 Brier Creek Express	44	19	2.315	14.3
Route KRX Knightdale Express	22	5	4.385	32.9
Route ZWX Zebulon Express	61	21	2.902	14.6
Route WFRX	66	4	16.593	40.0
TOTAL	193	49	3.938	10.1
OVERALL TOTAL	**16,569**	**2,131**	**7.775**	**1.6**

**Source: 2010 CAT Rider Survey*

2.2 CTran O/D Rider Survey

The CTran O/D rider survey sampled all existing weekday CTran routes over an average weekday period. The on-board O/D rider survey was administered on October 29, 2010. A total of 143 responses were received for the system. CTran systemwide average weekday boardings are estimated to be 450, which

is based on total ridership figures for FY 2009-2010. Overall, this sample size is accurate at the 90% confidence level, plus or minus 5.7% for systemwide statistics.

Beyond the systemwide statistics available for CTran, sampling response rates and accuracy levels is also observable by each surveyed route. **Exhibit 2-2** provides an overview of all CTran routes, showing the average FY 2009-2010 weekday ridership, total responses received by route, and the sampling error percentage. CTran routes whose sampling error exceeds +/- 10% are highlighted in red. While most routes exceeded the sampling error threshold of +/- 10% on an individual basis, overall the systemwide sample size is accurate at the 90% confidence level.

A sampling factor is calculated in order to expand the total route sample responses to the overall system as a whole. CTran ridership data from FY 2009-2010 provides the average weekday passenger boardings for each route. The total route sample provides the number of returned CTran O/D rider surveys by route. By dividing the total route sample by the average number of weekday boardings, a unique control factor is obtained for each route. This factor is applied to each response, by route, in order to equal the number of average daily weekday boardings.

Exhibit 2-2
Sampled CTran Routes

Route	Average Weekday Ridership	Total Route Responses	Sampling Factor	Sampling Error % - 90% Confidence
Route 1 Maynard	59	20	2.957	15.0
Route 2 Maynard	51	13	3.908	19.8
Route 3 Harrison	47	18	2.642	15.4
Route 4 High House	83	21	3.947	15.5
Route 5 Kildaire Farm	97	40	2.420	9.9
Route 6 Buck Jones	111	31	3.586	12.5
OVERALL TOTAL	**448**	**143**	**3.132**	**5.6**

**Source: 2010 CTran Rider Survey*

2.3 TTA O/D Rider Survey

The TTA O/D rider survey sampled most existing Wake County weekday TTA routes over the course of an average weekday period. TTA routes only serving Durham or Orange Counties were not surveyed, nor were Route 201 and Route 311. The scope of services was the development of a Wake County bus plan, so routes that served only other counties were not of interest, and Routes 201 and 311 were not surveyed due to low ridership and budgetary limitations. The on-board O/D rider survey was administered on November 4, 2010. Overall, a total of 649 responses were returned from the TTA survey. TTA systemwide average weekday boardings are estimated to be 2,524, which is based on average daily passenger counts from July 2010 to December 2010. Farebox passenger count data was used for this time period because of route changes that occurred in August 2010. Overall, this sample size is accurate at the 90% confidence level, plus or minus 2.8% for systemwide statistics.

Beyond the TTA systemwide statistics, sampling response rates and accuracy levels are detailed for each surveyed route. **Exhibit 2-3** provides an overview of all sampled TTA routes, showing the average

weekday ridership, total responses received by route, and the sampling error percentage. TTA routes whose sampling error exceeds +/- 10% are highlighted in red.

A sampling factor is calculated in order to expand the total route sample responses to the overall system as a whole. TTA ridership data from July 2010 to December 2010 provides the average weekday passenger boardings for each route. The total route sample provides the number of returned TTA O/D rider surveys by route. By dividing the total route sample by the average number of weekday boardings, a unique control factor is obtained for each route. This factor is applied to each response, by route, in order to equal the number of average daily weekday boardings.

Exhibit 2-3
Sampled TTA Routes

Route	Average Weekday Ridership	Total Route Responses	Sampling Factor	Sampling Error % - 90% Confidence
Route CRX Chapel Hill-Raleigh	488	196	2.489	4.5
Route DRX Durham-Raleigh	290	86	3.372	7.4
Route 100 RDU	568	92	6.173	7.8
Route 102 Garner	105	46	2.282	9.1
Route 105 RTP-Raleigh	334	78	4.282	8.1
Route 301 Cary-Raleigh	468	79	5.924	8.4
Route 303 Cary-Raleigh midday	102	38	2.684	10.5
Route 305 Apex-RTP	169	34	4.970	12.6
OVERALL TOTAL	**2,524**	**649**	**3.889**	**2.7**

**Source: 2010 TTA Rider Survey*

2.4 Wolfline O/D Rider Survey

The Wolfline O/D rider survey sampled all existing weekday Wolfline routes over an average weekday period. The on-board O/D rider survey was administered on November 3, 2010. As a whole, a total of 1,960 responses were received across the Wolfline system. The systemwide Wolfline average weekday boardings are estimated to be 9,530, which is based on total ridership figures for FY 2009-2010. Overall, this sample size is accurate at the 90% confidence level, plus or minus 1.7% for systemwide statistics.

Beyond the systemwide statistics available for Wolfline, sampling response rates and accuracy levels is available by each surveyed route. **Exhibit 2-4** provides an overview of all Wolfline routes, showing the average FY 2009-2010 weekday ridership, total responses received by route, and the sampling error percentage. Wolfline routes whose sampling error exceeds +/- 10% are highlighted in red.

A sampling factor is calculated in order to expand the total route sample responses to the overall system as a whole. Wolfline ridership data from FY 2009-2010 provides the average weekday passenger boardings for each route. The total route sample provides the number of returned Wolfline O/D rider surveys by route. By dividing the total route sample by the average number of weekday boardings, a unique control factor is obtained for each route. This factor is applied to each response, by route, in order to equal the number of average daily weekday boardings.

Exhibit 2-4
Sampled Wolfline Routes

Route	Average Weekday Ridership	Total Route Responses	Sampling Factor	Sampling Error % - 90% Confidence
Route 1 Avent Ferry	1,916	489	3.918	3.2
Route 2 North Campus	542	36	15.065	13.2
Route 3 Engineering	666	180	3.699	5.2
Route 4 Westgrove	262	68	3.859	8.5
Route 5 Varsity	800	389	2.056	2.9
Route 6 Carter Finley	524	67	7.814	9.3
Route 7 Wolflink Shuttle	1,322	233	5.673	4.8
Route 8 Southeast Loop	1,337	127	10.527	6.9
Route 9 Greek Village	1,577	188	8.388	5.6
Route 11 Village Link	308	115	2.678	6.0
Werewolf (nights)	138	3	46.000	46.9
Prowl (Th, Fr nights)	138	65	2.123	7.4
OVERALL TOTAL	**9,530**	**1,960**	**4.862**	**1.6**

**Source: 2010 Wolfline Rider Survey*

3 Survey Results

A total of 4,883 responses were received from CAT, CTran, TTA, and Wolfline riders. The results from the survey are summarized below. In some cases, questions were common to all four surveys while in others they were uniquely tailored to specific systems. As a result, summaries are grouped by question, with comparisons made among systems where applicable. Answers from the surveys provide insight into riders' travel, demographic, and attitudinal preferences. Specific components include a demographic profile of current riders, origin and destination location, and customer satisfaction responses by route and market segment. Results are presented for the weighted responses.

Results are not presented here for questions 2, 2A, 2B, 3, 3A (Wolfline only), 3B (Wolfline only), 3C (Wolfline only), 4B, 5A, 5B (Wolfline only), 5C (Wolfline only), 7, 7A, 7B, 8, 9B, 10B, 27 (CAT and CTran only), and 40 (TTA only) since they were open ended questions. However, the results of these questions can be found in the survey databases.

3.1 Trip Purpose

The results from several questions deserve highlighting. **Questions 1 and 6** asked riders about the purpose of their trip, including "Where did you come from before getting on this bus?" and "Where are you going now?". The results from CAT, CTran, TTA, and Wolfline riders provide insight into linkages between the various origin and destination points.

Exhibit 3-1 details the trip purposes of CAT riders. The major trip linkage was from people going from home to work (3,727, 23%) followed by riders going from work to home (2,042, 13%). The disparity between these two responses is partially affected by the morning bias – riders were more likely to fill

out their survey for their morning trip than their return trip in the evening. Other major trips include riders going from home to some other trip purpose type (1,047, 7%), home to shopping (690, 4%), and college to home (598, 4%). From home to personal business was also significant at 585 trips (4%). The data also revealed several oddities, including 774 riders who reported traveling from home to home. This likely resulted from riders' not understanding the question and reporting their round-trip instead of their one-way trip. Additionally 525 riders reported traveling from work to work which could be attributable to similar confusion, but could represent riders who use transit to commute between jobs.

Exhibit 3-1
CAT Origin/Destination Trip Purpose Matrix

From / To	Work	College	School (K-12)	Restaurant	Recreation	Medical	Personal	Home	Shopping	Other	No response	Total	%
Work	525	43	33	71	29	28	62	2,042	138	161	49	3,132	19.7%
College	116	126	9	5	6	17	23	598	58	71	30	1,029	6.5%
School (K-12)	-	-	49	3	-	54	-	213	17	34	-	369	2.3%
Restaurant	3	-	6	25	8	8	-	103	43	53	-	249	1.6%
Recreation	-	-	-	11	24	-	3	17	6	18	-	80	0.5%
Medical	3	16	12	-	-	21	5	239	41	53	6	390	2.5%
Personal	20	8	-	-	-	-	83	185	15	64	41	374	2.4%
Home	3,727	580	247	234	161	529	585	774	690	1,047	157	8,573	54.0%
Shopping	38	32	-	5	-	12	26	429	78	69	70	689	4.3%
Other	135	20	25	10	54	20	39	423	26	251	2	1,003	6.3%
No response	34	8	-	17	-	6	21	77	56	7	101		
Total	4,567	825	382	364	281	688	826	5,024	1,111	1,821		15,889	
%	28.7%	5.2%	2.4%	2.3%	1.8%	4.3%	5.2%	31.6%	7.0%	11.5%			

**Source: 2010 CAT Rider Survey*

The trip purposes of CTran riders are highlighted in **Exhibit 3-2**. The major trip linkage was from people going from home to work (164, 37%) followed by riders going from work to home (54, 12%). Many riders also reported traveling from work to work, totaling 43 trips (10%). Other major trips include riders going from home to some other trip purpose type (28, 6%) and home to shopping (27, 6%).

Exhibit 3-2
CTran Origin/Destination Trip Purpose Matrix

From / To	Work	College	School (K-12)	Restaurant	Recreation	Medical	Personal	Home	Shopping	Other	No response	Total	%
Work	43	-	-	-	-	-	-	54	13	6	-	116	26.1%
College	3	-	-	-	-	-	-	10	-	-	-	13	3.0%
School (K-12)	-	-	-	-	-	-	-	-	4	-	-	4	0.8%
Restaurant	4	-	-	-	-	-	-	2	-	-	-	6	1.4%
Recreation	-	-	-	-	-	-	-	4	-	-	3	4	0.8%
Medical	-	-	-	-	-	-	-	-	-	-	-	-	0.0%
Personal	-	-	-	-	-	-	-	3	-	-	-	3	0.6%
Home	164	8	-	13	4	7	4	5	27	28	2	258	58.3%
Shopping	7	-	-	-	-	-	4	9	2	2	-	24	5.4%
Other	11	-	-	-	-	-	-	-	4	-	-	15	3.5%
No response	-	-	-	-	-	-	-	-	-	-	-		
Total	232	8	-	13	4	7	7	86	49	37		443	
%	52.5%	1.8%	0.0%	2.9%	0.8%	1.6%	1.6%	19.5%	11.2%	8.2%			

**Source: 2010 CTran Rider Survey*

Exhibit 3-3 outlines the trip purposes of TTA riders. The major trip linkage was from people going from home to work (889, 36%) followed by riders going from work to home (510, 21%). Other major trips include riders going from home to college (225, 9%) and college to home (163, 7%). Trips from home to some other trip purpose type were also poplar, totaling 80 total trips (3%).

Exhibit 3-3
TTA Origin/Destination Trip Purpose Matrix

From / To	Work	College	School (K-12)	Restaurant	Recreation	Medical	Personal	Home	Shopping	Other	No response	Total	%
Work	60	30	-	17	3	-	9	510	-	35	8	663	26.7%
College	23	80	-	-	-	-	10	163	6	23	-	307	12.4%
School (K-12)	-	-	-	-	-	-	-	5	-	-	-	5	0.2%
Restaurant	-	-	-	-	-	-	-	-	-	6	-	6	0.2%
Recreation	-	-	-	3	3	-	-	12	6	-	-	24	1.0%
Medical	4	-	-	-	-	3	-	16	-	-	-	23	0.9%
Personal	-	7	-	-	-	-	-	34	6	-	6	47	1.9%
Home	889	225	17	6	6	29	25	37	6	80	2	1,322	53.2%
Shopping	-	-	-	-	-	-	-	6	-	-	-	6	0.2%
Other	29	12	-	-	-	-	3	23	-	15	-	81	3.3%
No response	6	7	-	-	-	-	-	11	-	-	-		
Total	1,006	354	17	25	12	32	47	806	25	160		2,483	
%	40.5%	14.3%	0.7%	1.0%	0.5%	1.3%	1.9%	32.5%	1.0%	6.4%			

**Source: 2010 TTA Rider Survey*

The trip purposes of Wolfline riders are presented in **Exhibit 3-4**. The major trip linkage was from people going from home to university (3,364, 36%). This was followed by trips made from university to university (2,087, 22%), which reflects the significant role transit plays in facilitating trips made internally within the NC State campus. Other major trips include riders going from university to home (1,825, 19%) and home to work (388, 4%).

Exhibit 3-4
Wolfline Origin/Destination Trip Purpose Matrix

From / To	Work	University	Medical	Personal	Home	Other	No response	Total	%
Work	76	113	11	2	232	33	-	467	4.9%
University	189	2,087	38	69	1,825	257	20	4,465	47.2%
Medical	-	6	2	-	13	-	-	21	0.2%
Personal	15	18	-	14	75	8	-	130	1.4%
Home	388	3,364	2	82	130	151	11	4,117	43.5%
Other	-	139	-	4	80	48	6	270	2.9%
No response	-	-	-	-	-	-	24		
Total	669	5,726	53	170	2,356	497		9,470	
%	7.1%	60.5%	0.6%	1.8%	24.9%	5.2%			

**Source: 2010 Wolfline Rider Survey*

Exhibit 3-5 summarizes the trip purposes for each system. In this table, "home" has been excluded as a trip purpose and home-to-home trips are not included in the totals. The purpose allocation assigned all trips with home on one end to the other trip purpose, e.g. home-to-work were all assigned to the work trip purpose. For trips that went between two other destinations, such as work-to-school, half the trips were allocated to each trip purpose. Wolfline did not provide as many trip choices since the survey instrument was a half-sized survey card due to the limited time riders spent on the bus.

Exhibit 3-5
Summary Trip Purpose

	CAT		CTran		TTA		Wolfline	
Trip Purpose	**Total**	**Percent**	**Total**	**Percent**	**Percent**	**Percent**	**Total**	**Percent**
Work	6,734	44.6%	283	64.6%	1,534	62.7%	878	9.4%
College/University	1,516	10.0%	20	4.5%	525	21.5%	7,690	82.3%
School (K-12)	605	4.0%	2	0.4%	22	0.9%		
Restaurant	475	3.1%	17	3.9%	19	0.8%		
Recreation	270	1.8%	7	1.6%	27	1.1%		
Medical	923	6.1%	7	1.6%	50	2.0%	45	0.5%
Personal Business	985	6.5%	8	1.8%	76	3.1%	228	2.4%
Shopping	1,460	9.7%	54	12.4%	21	0.9%		
Other	2,147	14.2%	40	9.1%	172	7.0%	499	5.3%
TOTAL	**15,114**	**100%**	**438**	**100%**	**2,446**	**100%**	**9,340**	**100%**
Above total excludes home-to-home, and home as a trip purpose								
The Wolfline survey did not provide all the choices available on the other surveys; personal business included social and worship.								

The major trip purpose on the three municipal systems were all for work trips, with nearly two-thirds of the trips for this purpose on both the CTran and Triangle Transit systems. CAT had a plurality of trips for this purpose. Wolfline notably had almost 10% of its trips for work. Not surprisingly, the vast majority of trips on the Wolfline service were related to school trips to the university. Triangle Transit also showed a significant percentage of trips, over 1-in-5 for this trip purpose, with CAT also showing a large percentage of trips. The other major trip purpose was for shopping on both the CAT and CTran systems, with around 10% of the trips for this purpose on each system.

3.2 System Transfers

In **Questions 4A and 9A**, the interconnectedness of the systems was enlightening. **Exhibit 3-6** details both internal and external transfers between the various transit systems. With only Wake County routes surveyed, the majority of captured transfer activity occurred between CAT, CTran, and TTA. The question was not asked on the Wolfline survey form.

Overall, the largest number of transfers occurred internally within CAT, with 12,103 riders transferring from one CAT bus to another CAT bus. Second was TTA with 736 riders reporting internal transfers followed by CTran with 120. The majority of external transfers were concentrated around TTA. TTA received a substantial number transfers from CAT (1,140); nearly as many as from other TTA buses. The reverse was also true, with CAT receiving a substantial number of transfers from TTA (1,265). Similarly, many TTA transfers went to CTran (144); slightly more than were internal CTran transfers. This clearly indicates the recent regional pass was a great development.

Exhibit 3-6
Transfer Matrix By System

From / To	CAT	CTran	TTA	Wolfline	CHT	DATA	Duke	Other	No response	Total	%
CAT	12,103	25	1,140	105	5	50	6	195	9,544	**13,629**	**81.0%**
CTran	20	120	114				3	4	3	**261**	**1.6%**
TTA	1,265	144	736	110	66	57		29	1,569	**2,407**	**14.3%**
Wolfline	42		13							**55**	**0.3%**
CHT	21		36							**57**	**0.3%**
DATA	46		89							**135**	**0.8%**
Duke	8		2							**10**	**0.1%**
Other	215		56							**271**	**1.6%**
No response	9,060		1,506							**10,566**	
Total	**13,720**	**289**	**2,186**	**215**	**71**	**107**	**9**	**228**	**11,116**	**16,825**	**100%**
%	**81.5%**	**1.7%**	**12.9%**	**1.3%**	**0.4%**	**0.6%**	**0.0%**	**1.4%**			

**Source: 2010 Rider Surveys*

Exhibit 3-7 presents overall transfer activity by system. CAT riders were the most likely to transfer at least once, with 61.5% reporting at least one transfer. TTA riders were the least likely to have to transfer, with 47.9% reporting they did not have to transfer, but those that did transfer are more likely to have transferred two or more times.

Exhibit 3-7
Transfer Activity By System

	CAT		CTran		TTA	
No transfer	5,829	38.5%	190	44.6%	1,165	47.9%
1 transfer	7,412	48.9%	198	46.6%	877	36.0%
2+ transfers	1,912	12.6%	37	8.8%	391	16.1%
TOTAL	**15,153**	**100%**	**426**	**100%**	**2,433**	**100%**

**Source: 2010 Rider Surveys*

3.3 Other Highlights

In **Question 13**, TTA has moved away from cash fares; most of its activity is from some sort of pass. CAT and CTran are still heavily reliant on cash fares, especially CTran.

The demographics of the systems are distinctive. TTA has a great mix of riders, with the surprise that it is not even more heavily oriented to choice riders. It is a premium service with a premium fare, but in many cases the riders are more "local" in nature. CAT is heavily transit dependent, but CTran was more diverse than anticipated. CTran also has a large Hispanic minority.

The results on how riders would like to receive information are enlightening (**Question 26**). The in-person methods are still overwhelmingly preferred, but there is a significant amount of riders who like the "new media". Even the more traditional CAT and CTran riders (lower income, minority, etc), still showed that 20-25% of the riders prefer these new approaches.

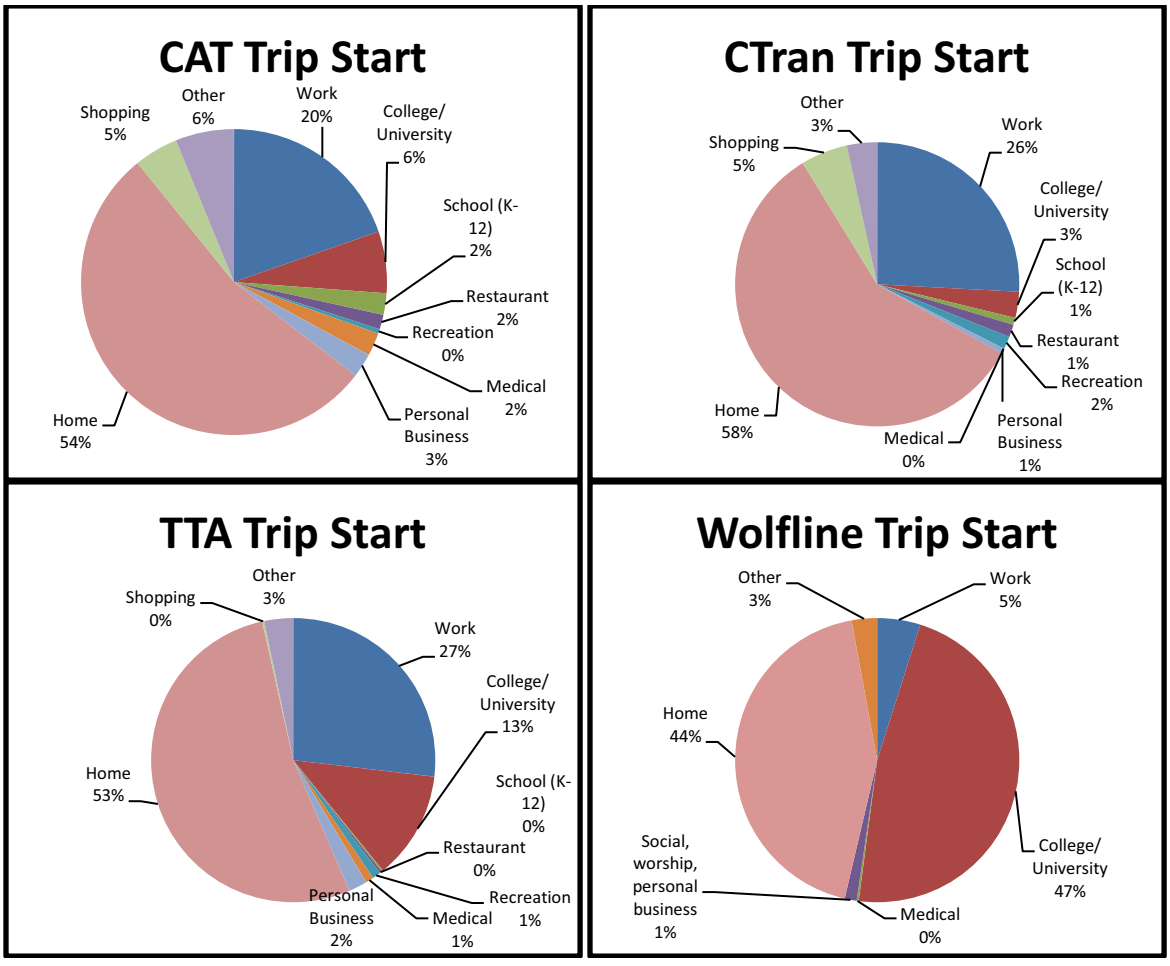
The list of desired improvements was similar among systems. Frequency of service was ranked high on all systems, as was more evening service. On-time is an issue for both CAT and TTA. Sunday service is a desire by both CAT and CTran riders. Shelters were also important to riders on all systems.

Additional observations are included in the results for each question.

Q1. Where did you come from before getting on this bus?

1) Work
2) College/University
3) School (K-12) (*Medical/dental appointment*)
4) Restaurant (*Social/worship/personal business*)
5) Recreation (*Home*)
6) Medical (*Other*)
7) Personal Business
8) Home
9) Shopping
10) Other

*Italicized choices represent those found on the Wolfline survey form only (organized by choice number)



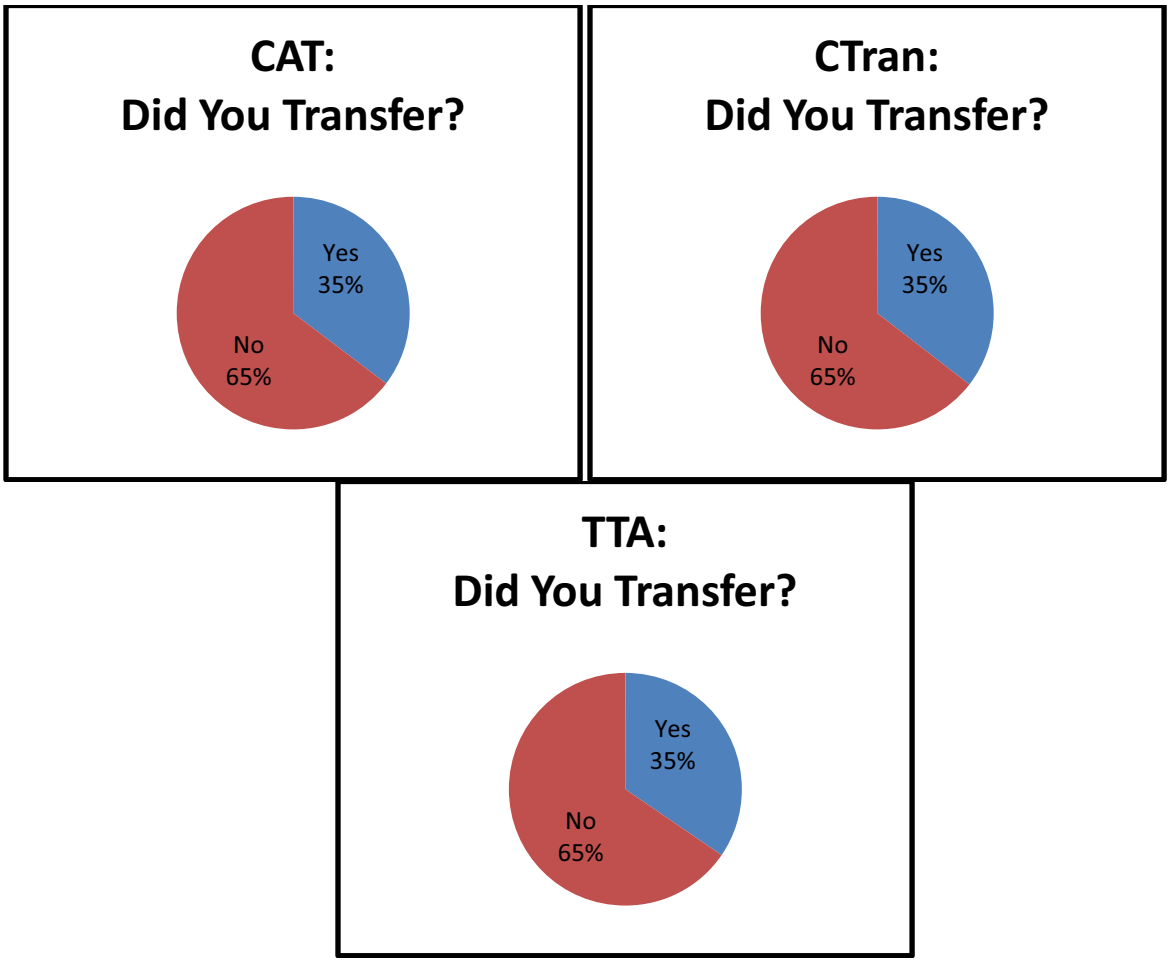
KEY FINDINGS

In the case of CAT, CTran, and TTA, the majority of riders were surveyed on their origin trip from home. Besides "home", the next most popular origin across each of the three systems was "work" encompassing roughly a quarter of total responses. Wolfline riders' trip origins were split between "college/university" and "home". These results are to be expected given Wolfline's predominant student population.

Q4. Did you transfer to get to this bus?*

*Question was not asked on Wolfline survey

1) Yes
2) No



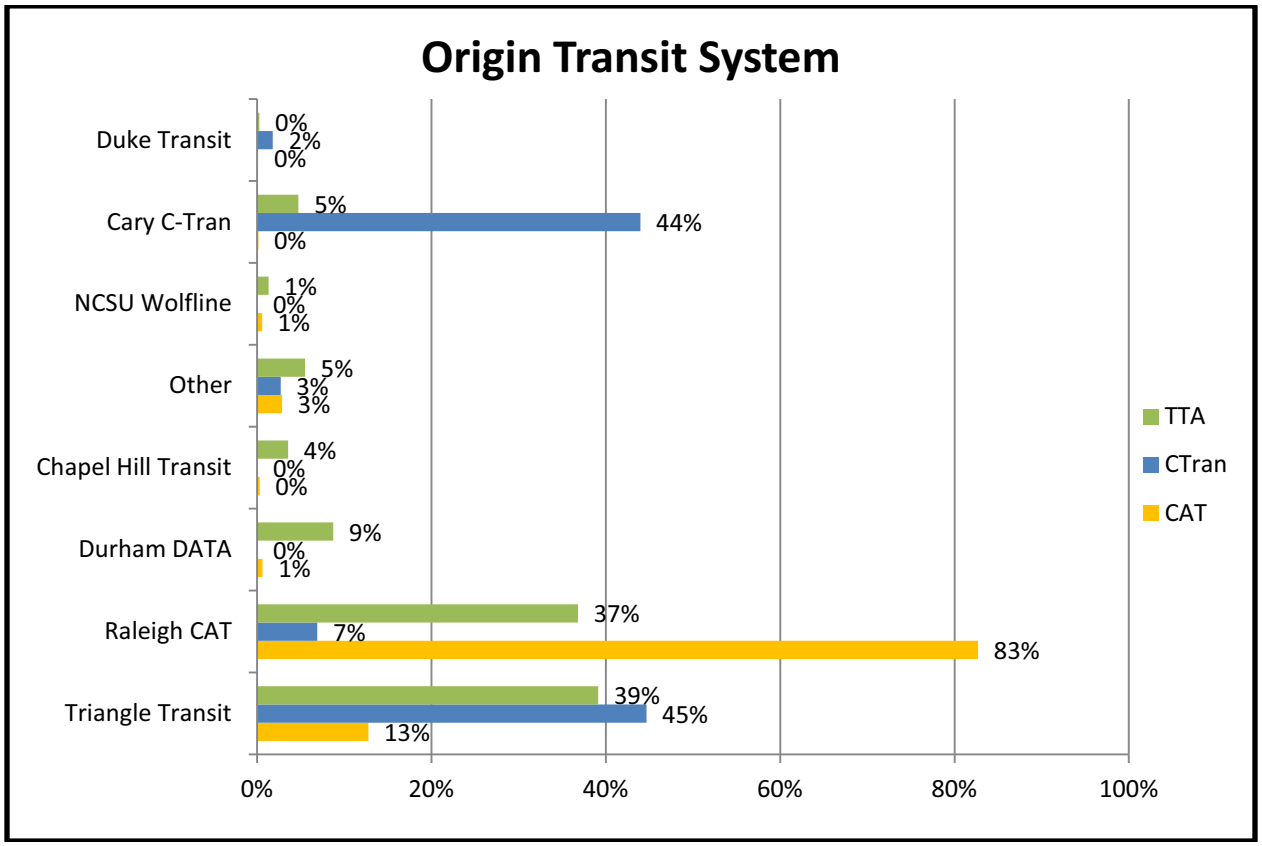
KEY FINDINGS

Across CAT, CTran, and TTA, the results were consistent: the majority of surveyed riders did not transfer prior to boarding.

Q4A. If yes, what system did you come from?*

*Question was not asked on Wolfline survey

1) Triangle Transit
2) Raleigh CAT
3) Durham DATA
4) Chapel Hill Transit
5) Other
6) NCSU Wolfline
7) Cary CTran
8) Duke Transit



KEY FINDINGS

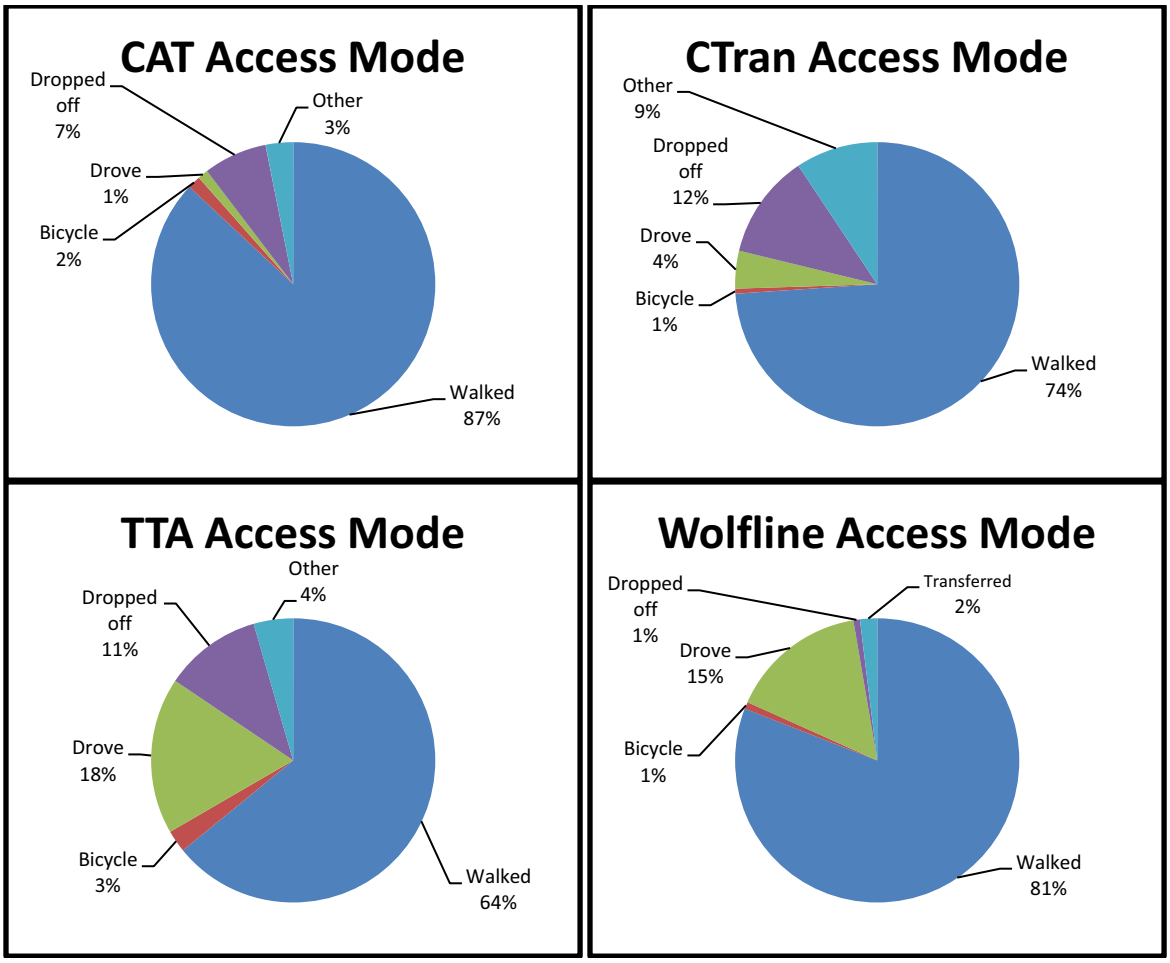
For CAT, the vast majority of transfer activity occurred internally within the system. CTran riders were roughly evenly split between internal transfer activity and transit trips originating aboard TTA. TTA riders were similar, with a roughly even split between internal transfer activity and transit trips originating aboard CAT. Low DATA, Duke, and CHT responses for TTA reflect that only Wake County routes were surveyed.

Q5. How did you get to your first bus?*

*Question #2 on Wolfline survey form

1) Walked
2) Bicycled /*(Rode a bicycle)*
3) Drove /*(Drove and parked)*
4) Dropped off
5) *Transferred*
6) Other

*Italicized choices represent those found on the Wolfline survey form only (organized by choice number)



KEY FINDINGS

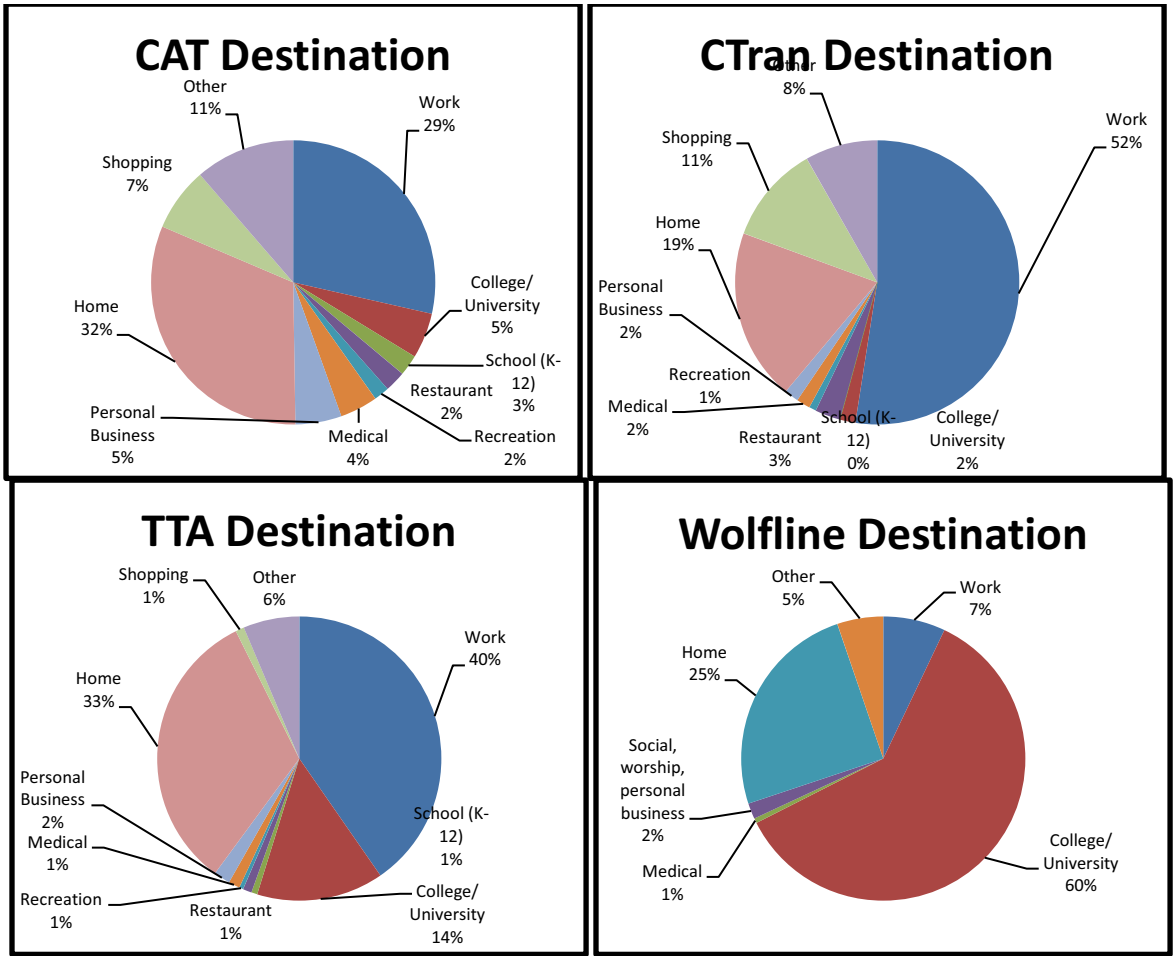
Across all four systems, a majority of riders walked to the bus. This is especially true for CAT and Wolfline riders, which is likely influenced by the larger share of transit dependent riders using the system. For TTA, nearly a third of riders used a car to access their bus when combining the "drove" and "dropped off" responses. This finding is influenced by TTA's larger share of choice commuters.

Q6. Where are you going now?*

*Question #4 on Wolfline survey form

1) Work
2) College/University
3) School (K-12)/ *(Medical/dental appointment)*
4) Restaurant /*(Social, worship, personal business)*
5) Recreation/*(Home)*
6) Medical/*(Other)*
7) Personal Business
8) Home
9) Shopping
10) Other

*Italicized choices represent those found on the Wolfline survey form only (organized by choice number)



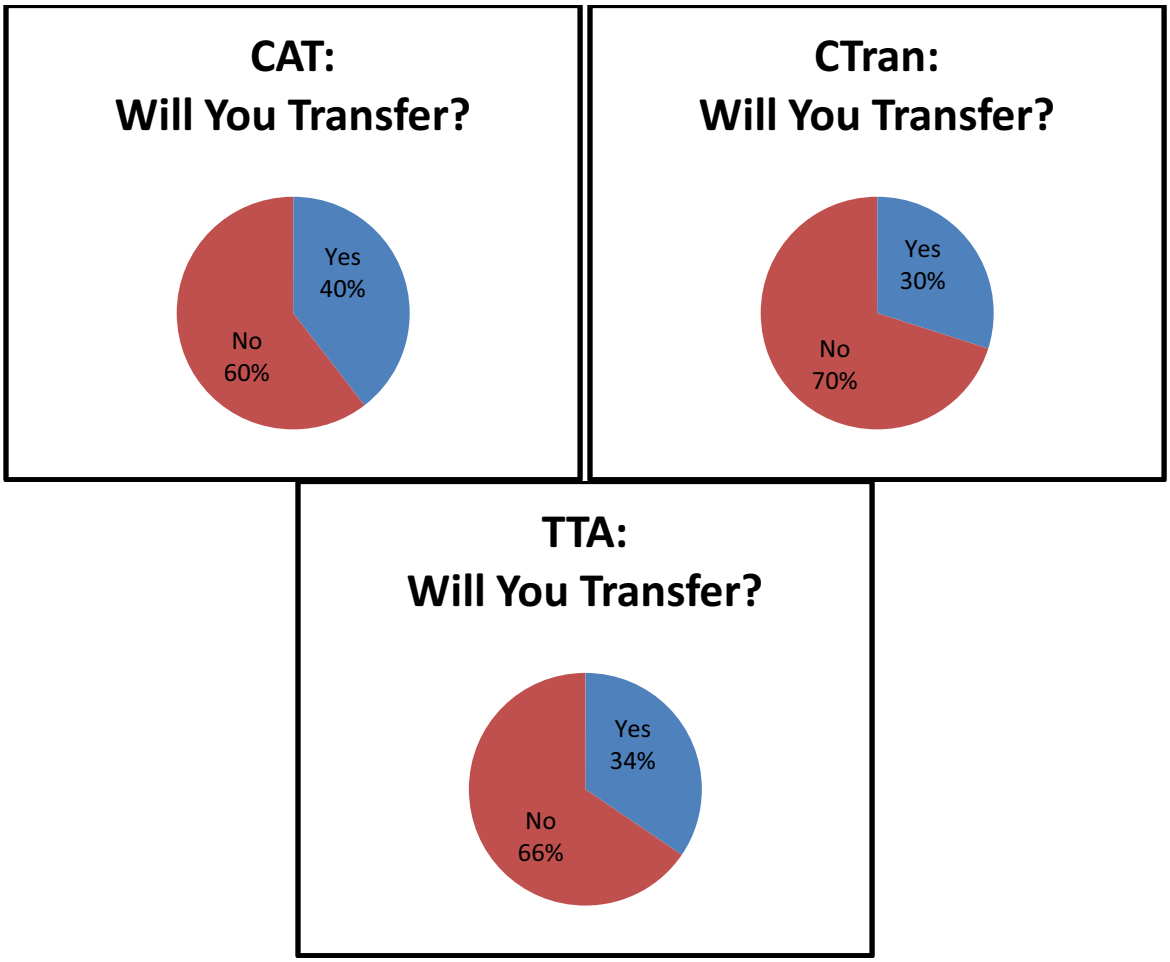
KEY FINDINGS

For CAT, CTran, and TTA users, the majority of riders surveyed responded with "home" or "work" as their trip destination. Of the three systems, CAT had the highest share of reported discretionary trip destinations. This is likely influenced by CAT having the largest share of transit dependent riders among the four systems surveyed. For Wolfline riders, as expected, the system differed from CAT, CTran, or TTA in that the majority of riders responded that they were on their way to campus.

Q9. Will you transfer when you get off this bus?*

*Question was not asked on Wolfline survey

1) Yes
2) No



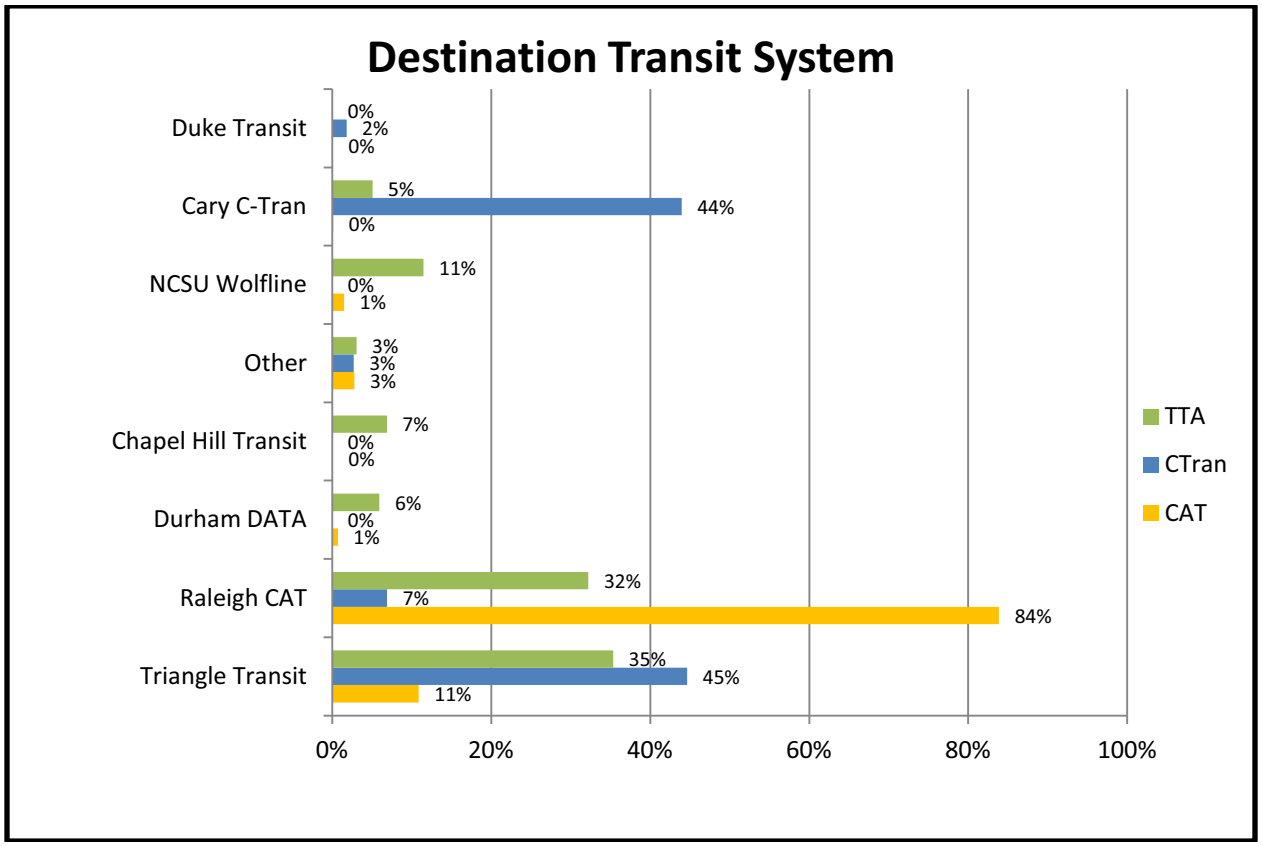
KEY FINDINGS

Across CAT, CTran, and TTA, the results were consistent: the majority of surveyed riders did not plan on transferring after alighting from the bus.

Q9A. If yes, what transit system will you transfer to?*

*Question was not asked on Wolfline survey

1) Triangle Transit	5) Other
2) Raleigh CAT	6) NCSU Wolfline
3) Durham DATA	7) Cary CTran
4) Chapel Hill Transit	8) Duke Transit



KEY FINDINGS

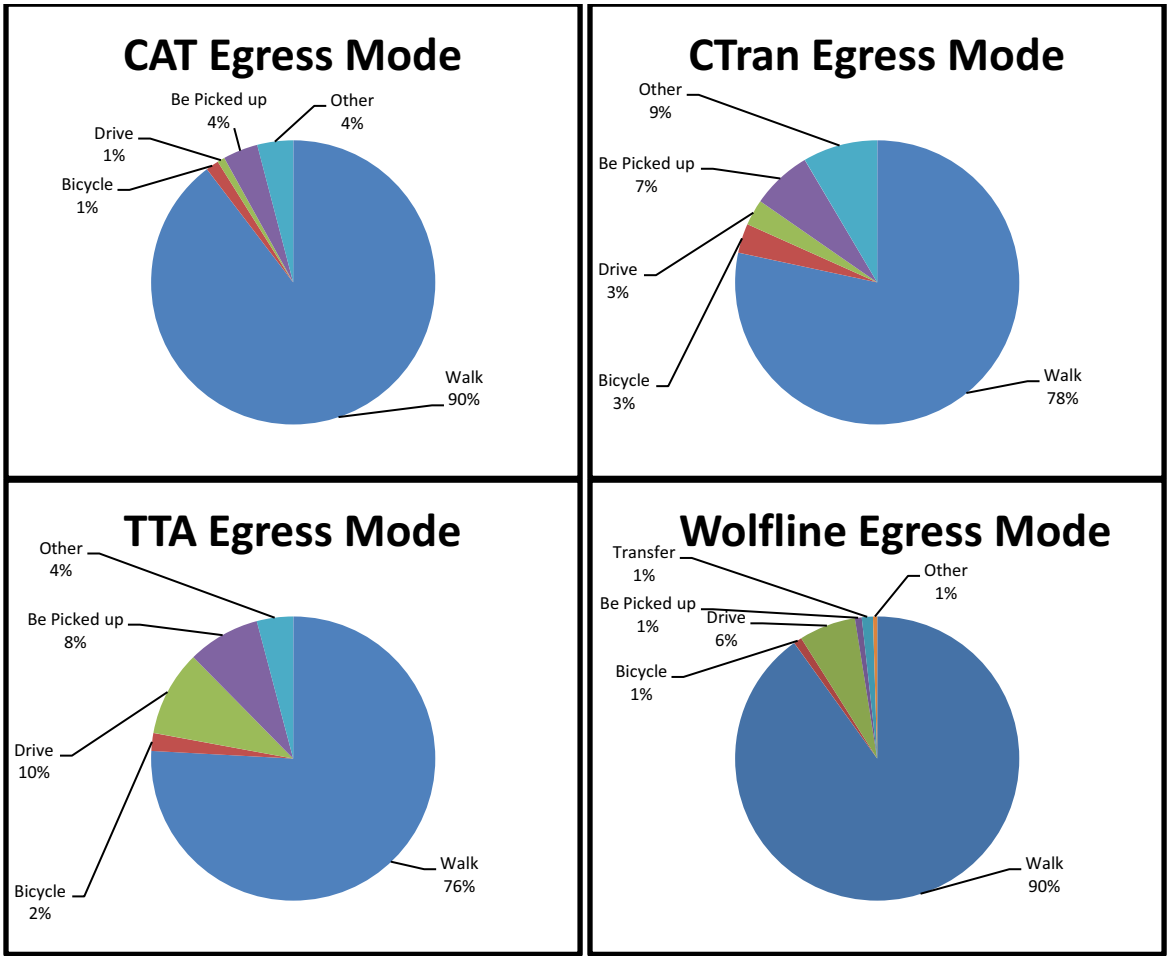
For CAT, roughly 85% of total transfers were to other CAT buses. CTran riders were roughly split between internal transfer activity and boarding TTA buses. TTA riders were similar, with a split between internal transfer activity and boarding CAT buses. Low DATA, Duke, and CHT responses for TTA reflect that only Wake County routes were surveyed.

Q10. How will you get to where you are going when you get off your last bus?*

*Question #6 on Wolfline survey form

1) Walk
2) Bicycle/*(Ride a bicycle)*
3) Drive /*(Drove and parked)*
4) Be picked up
5) *(Transfer to another bus)*
6) Other

*Italicized choices represent those found on the Wolfline survey form only (organized by choice number)



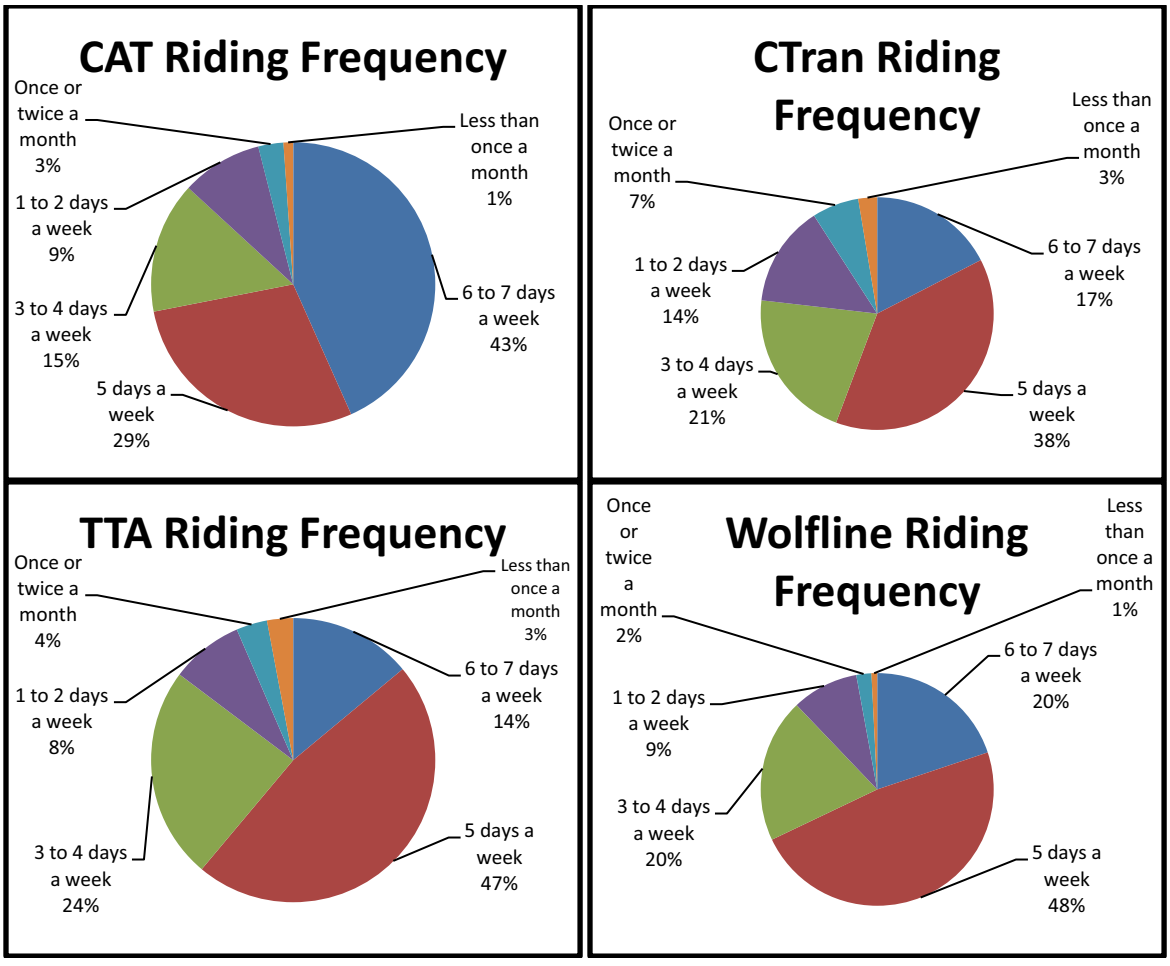
KEY FINDINGS

Across all four surveyed systems, the majority of riders reported walking from the bus. Besides "walk", the next most popular modes were "drive" and "be picked up". Compared to the other three systems, TTA had the largest share of riders who reported either driving or being picked up from the bus. This finding likely reflects the large share of choice riders using TTA's bus service for commuting purposes.

Q11. How often do you ride the bus?*

*Question #7 on Wolfline survey form

1) 6 to 7 days a week
2) 5 days a week
3) 3 to 4 days a week
4) 1 to 2 days a week
5) Once or twice a month
6) Less than once a month



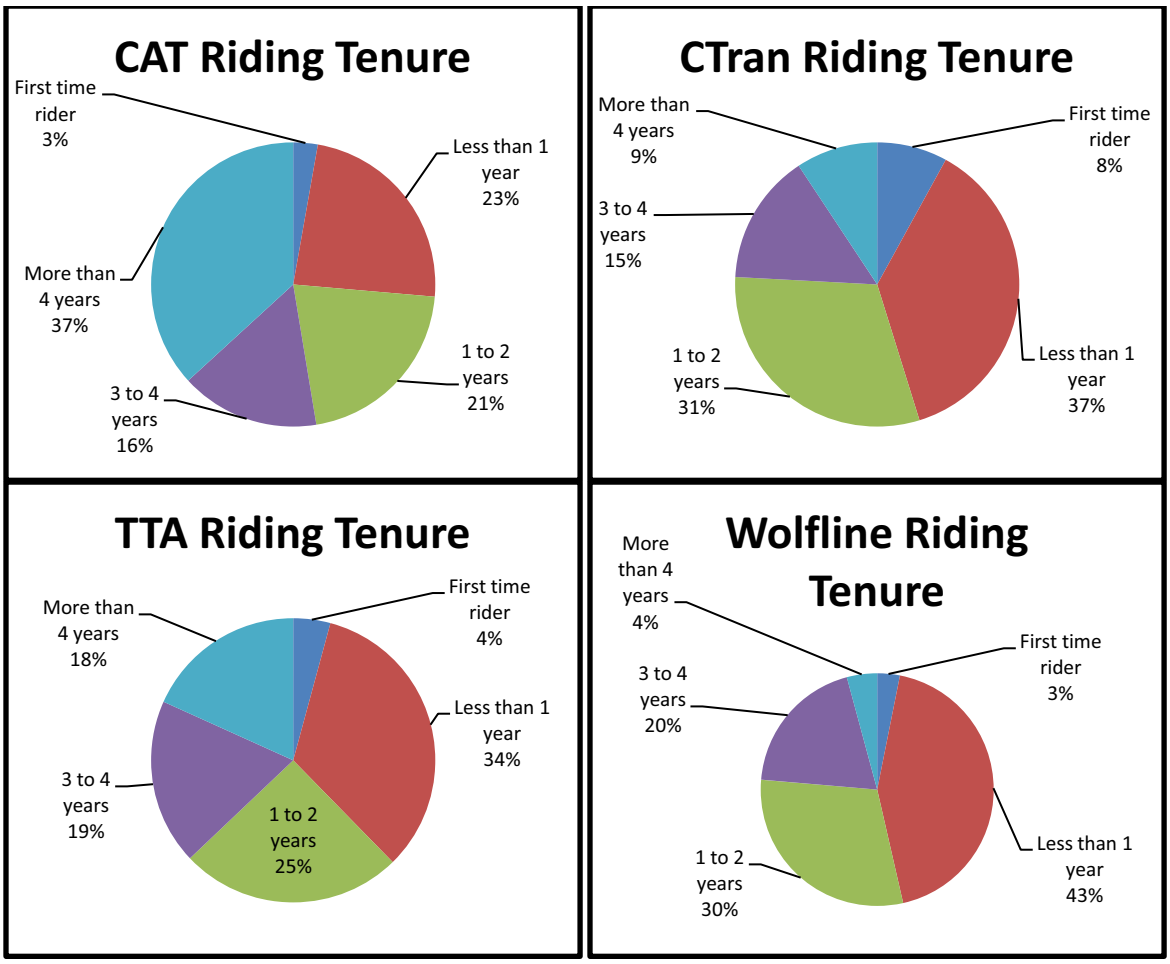
KEY FINDINGS

For CTran, TTA, and Wolfline, a plurality of riders responded using the bus 5 days a week. This is likely due to the high proportion of users who use these systems for commute trips to work and school. For CAT, a plurality of riders responded riding the bus 6 to 7 days a week. With CAT riders more likely to be from the traditional transit markets, these findings illustrate that riders rely on the system for not only work trips but discretionary trip purposes as well.

Q12. How long have you been riding [CAT/CTran/TTA/Wolfline]?*

*Question #8 on Wolfline survey form

1) First time rider
2) Less than 1 year
3) 1 to 2 years
4) 3 to 4 years
5) More than 4 years



KEY FINDINGS

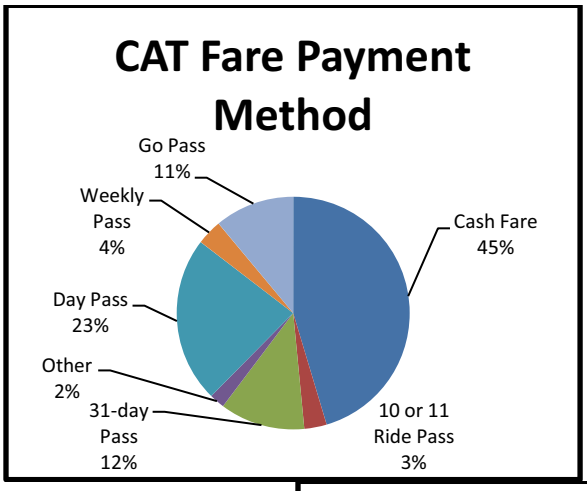
CTran and TTA riders were relatively new to each system, with a plurality responding that they had been riding for less than a year. However, CTran only recently began fixed-route service in December 2005, which limits the potential for long-term riders. CAT riders had the highest share of long-term riders, with a plurality responding that they had been using the system for more than four years. With Wolfline's riders primarily made up of students, with a high proportion being undergraduates, as expected most responded using the system less than four years.

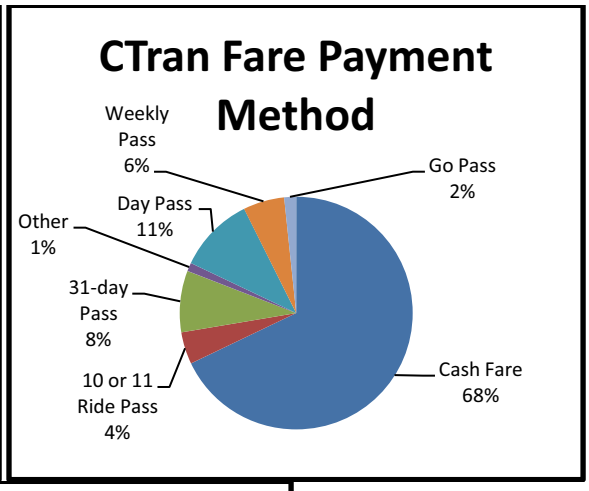
Q13. How did you pay your bus fare?*

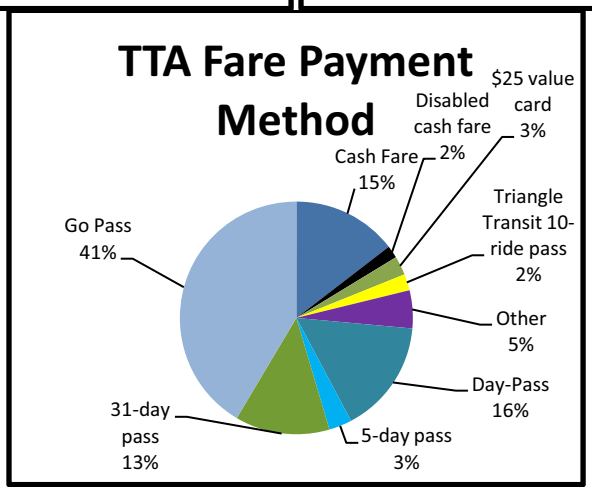
*Question was not asked on Wolfline survey as the service is fare free

1) Cash fare
2) 10 or 11 ride pass/*(Disabled fare card)*
3) 31-day pass/ *($25 value card)*
4) Other */(Triangle Transit 10-ride pass)*
5) Day Pass/*(Other)*
6) Weekly Pass/*(Day Pass)*
7) Go Pass *(5-day pass)*
8) *(31-day pass)*
9) *(Go Pass)*

*Italicized choices represent those found on the TTA survey form only (organized by choice number)







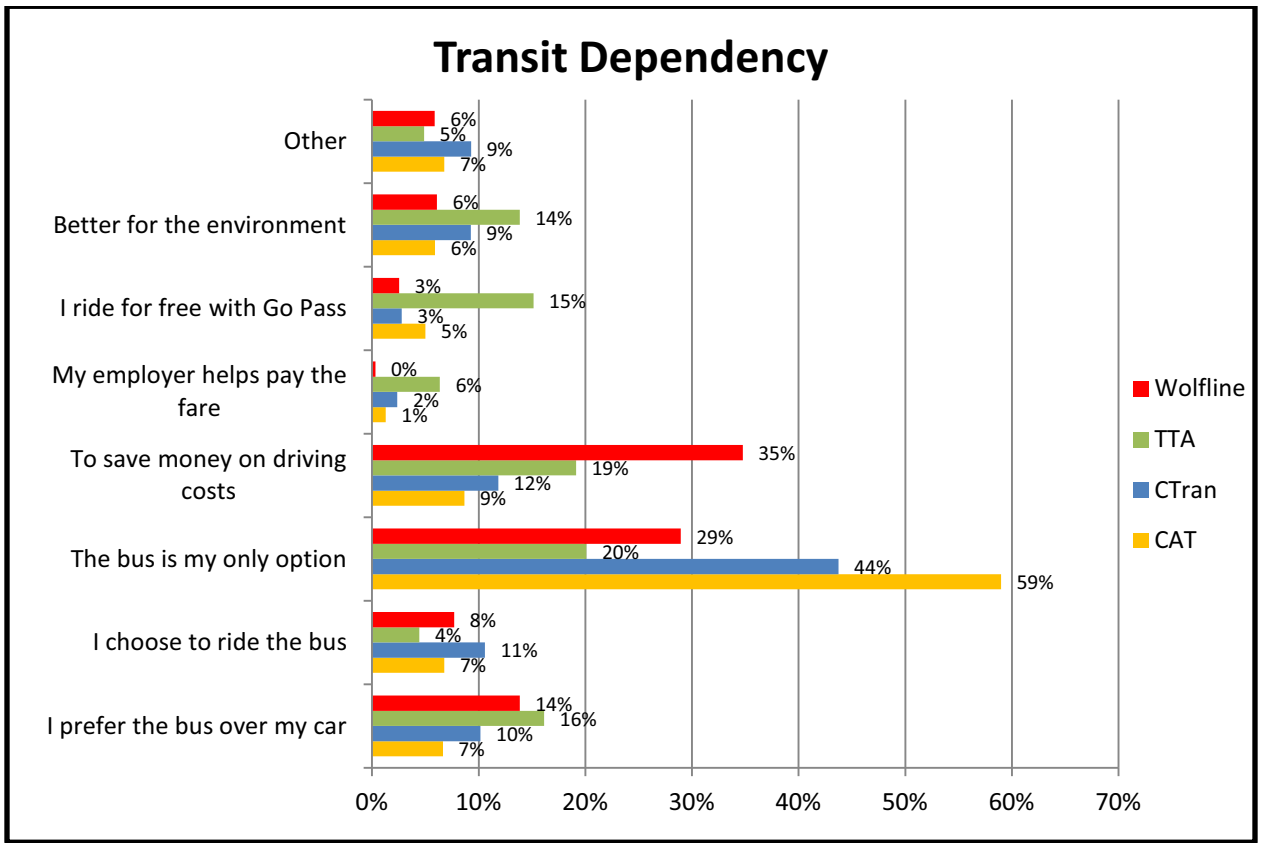
KEY FINDINGS

In the case of CAT and CTran, a majority of riders paid their fare by cash or by buying a system day-pass. For TTA, a plurality made use of the regional Go Pass. This could be due to the regional nature of TTA's service, having the highest fare among the four surveyed transit systems, or the relative affluence of TTA riders.

Q14. Why are you using the bus for this trip?*

*Question #9 on Wolfline survey form

1) I prefer the bus over my car
2) I chose to ride the bus
3) The bus is my only option
4) To save money on driving costs
5) My employer helps pay the fare
6) I ride free with Go Pass
7) Better for the environment
8) Other



KEY FINDINGS

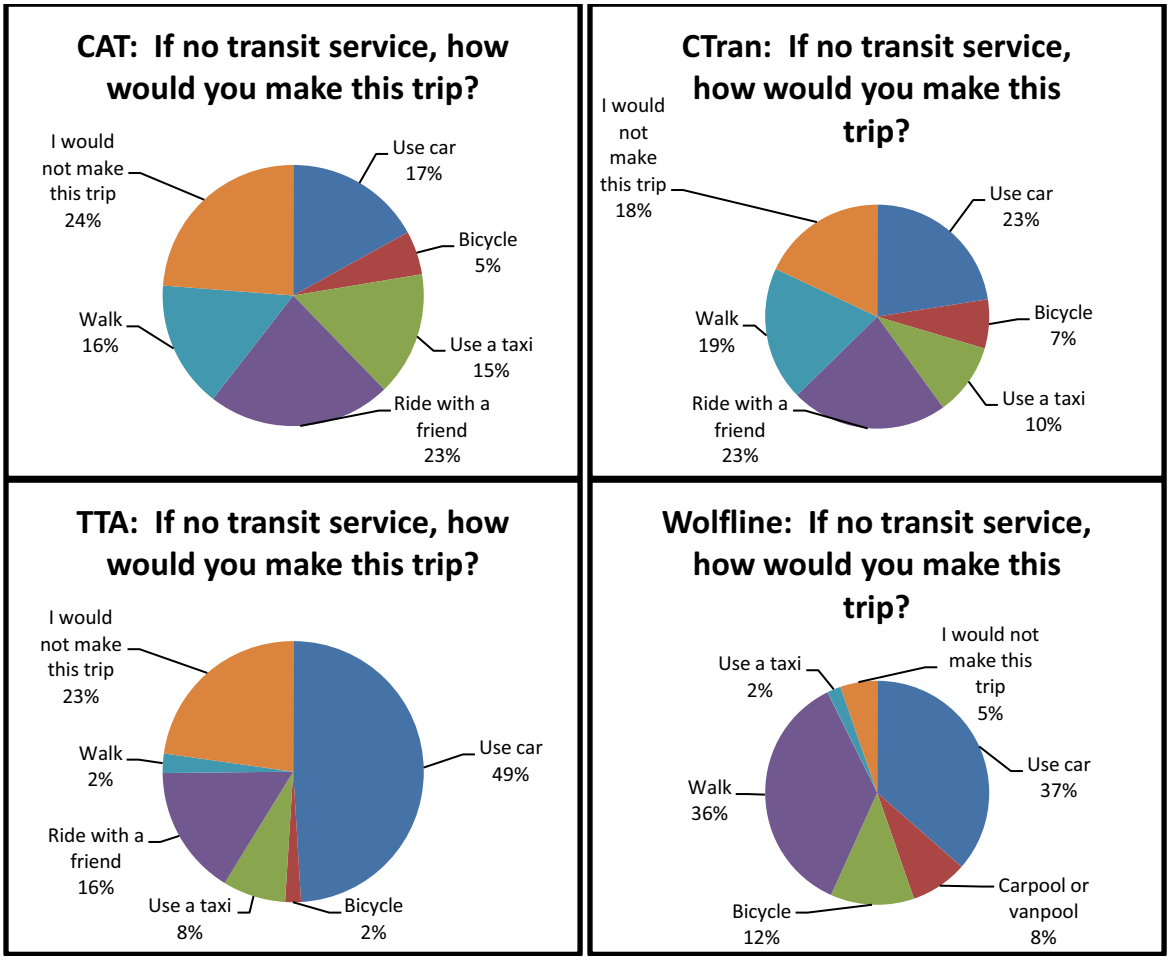
The majority of CAT riders responded the bus was their only option, reflecting CAT's position as primarily serving the traditional transit markets. The reasons for riding TTA and Wolfline were more reflective of choice riders, which is likely based on the high proportion of work commuters and students who use both of these systems. For CTran, the results suggested a combination of both traditional and choice riders using the system.

Q15. If transit service were not available, how would you make this trip?*

*Question #10 on Wolfline survey form

1) Use car
2) Bicycle *(Carpool or vanpool)*
3) Use a taxi *(Bicycle)*
4) Ride with a friend *(Walk)*
5) Walk *(Use a taxi)*
6) I would not make this trip

*Italicized choices represent those found on the Wolfline survey form only (organized by choice number)



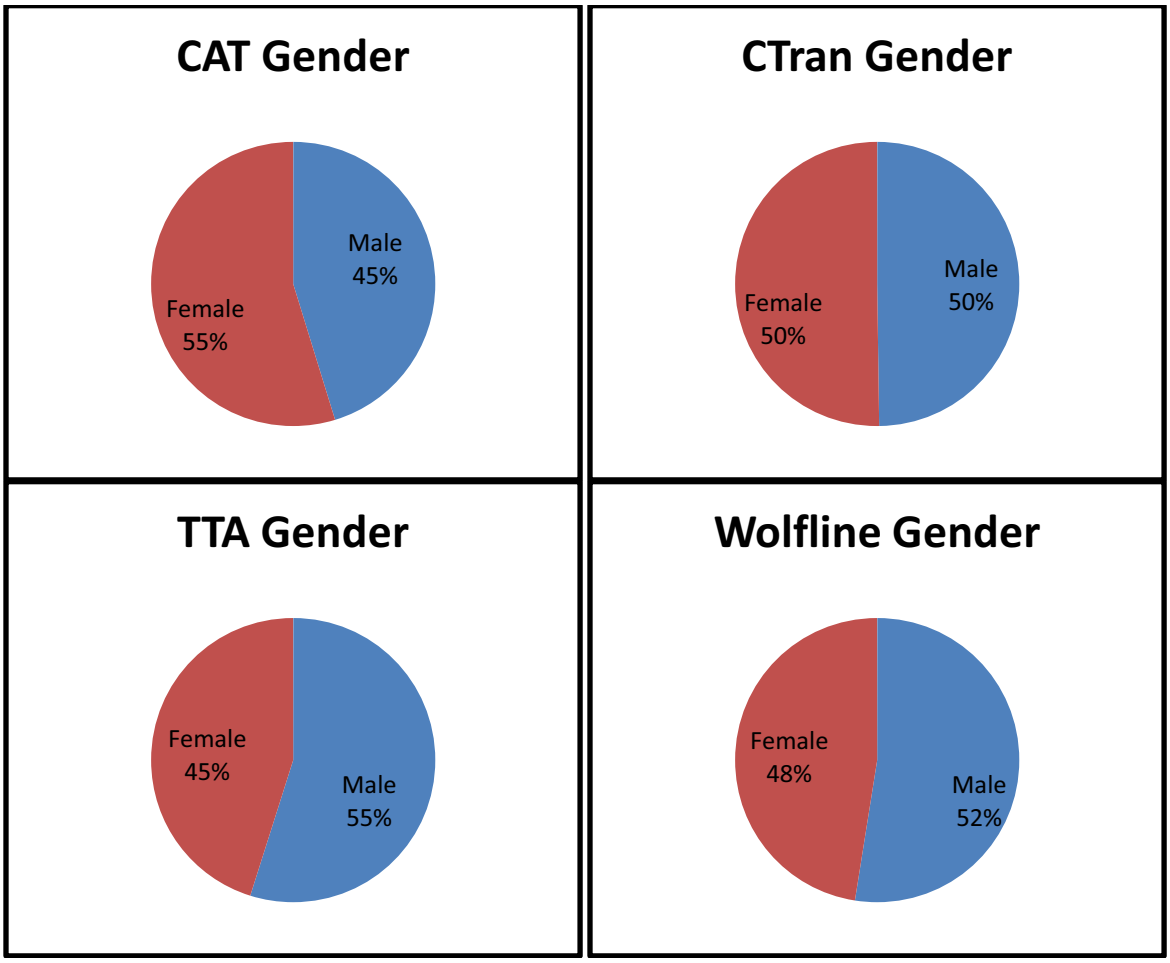
KEY FINDINGS

A plurality of TTA and Wolfline riders responded that they would use their car, which reinforces the notion of their users being primarily choice riders. A near majority of CAT riders responded that they would either not make the trip or would ride with a friend, reinforcing the notion of CAT's patrons being from the traditional transit markets. The results for CTran suggested a combination of traditional and choice riders.

Q16. I am [gender]?*

*Question #11 on Wolfline survey form

1) Male
2) Female



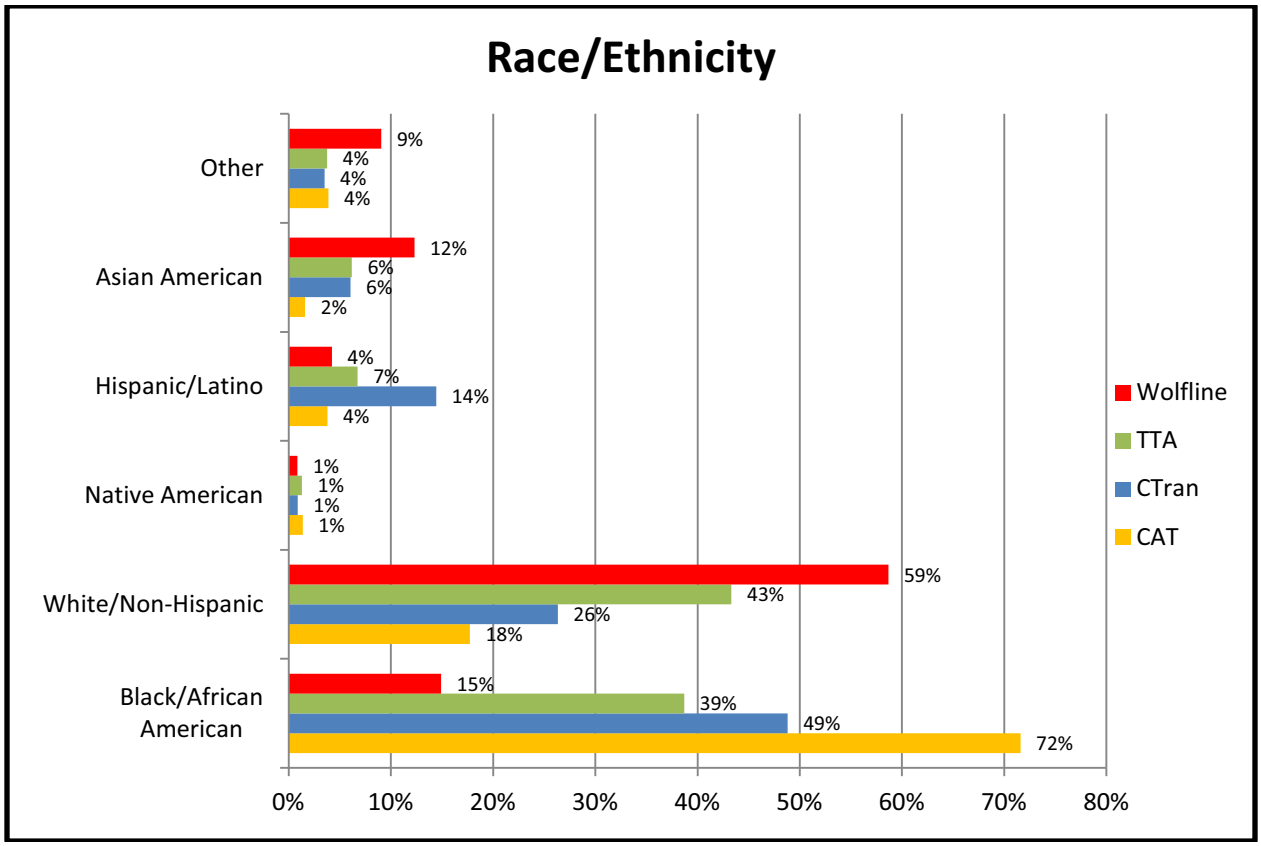
KEY FINDINGS

A majority of riders for TTA and Wolfline were males. For CAT, the majority were females. CTran was evenly split among male and female riders.

Q16A. I am [race/ethnicity]?*

*Question #11A on Wolfline survey form

1) Black/African American
2) White/Non-Hispanic
3) Native American
4) Hispanic/Latino
5) Asian American
6) Other



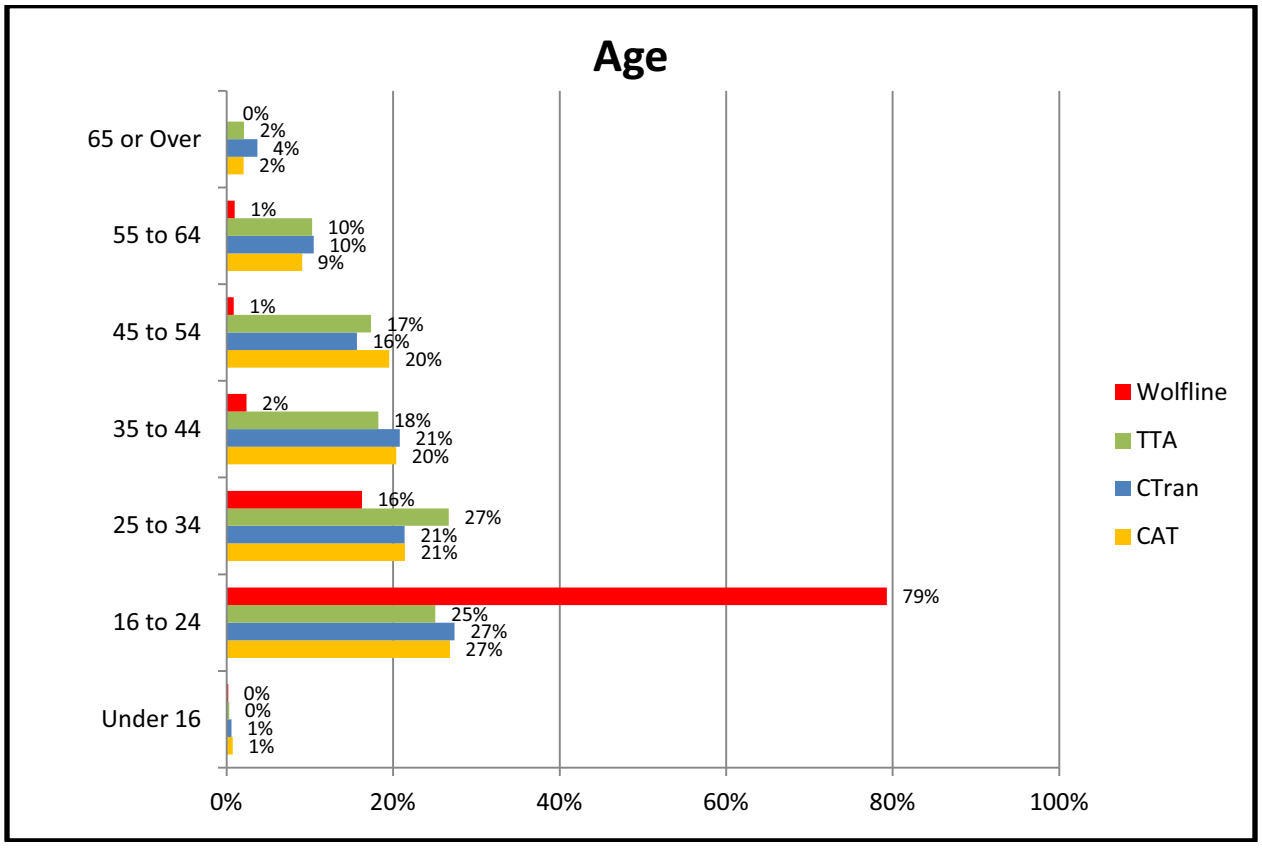
KEY FINDINGS

A large majority of CAT riders were Black, accounting for nearly three-quarters of the riders. Triangle Transit and CTran are more racially diverse, with Whites and Blacks accounting for nearly equal shares of riders. CTran riders were more likely to be Black, but Whites and Hispanics collectively comprised 40% of the riders. A majority of Wolfline riders were White, though the system had sizable percentage of Black, Asian, and Other riders.

Q17. What is your age?*

*Question #12 on Wolfline survey form

1) Under 16
2) 16 to 24
3) 25 to 34
4) 35 to 44
5) 45 to 54
6) 55 to 64
7) 65 or Over



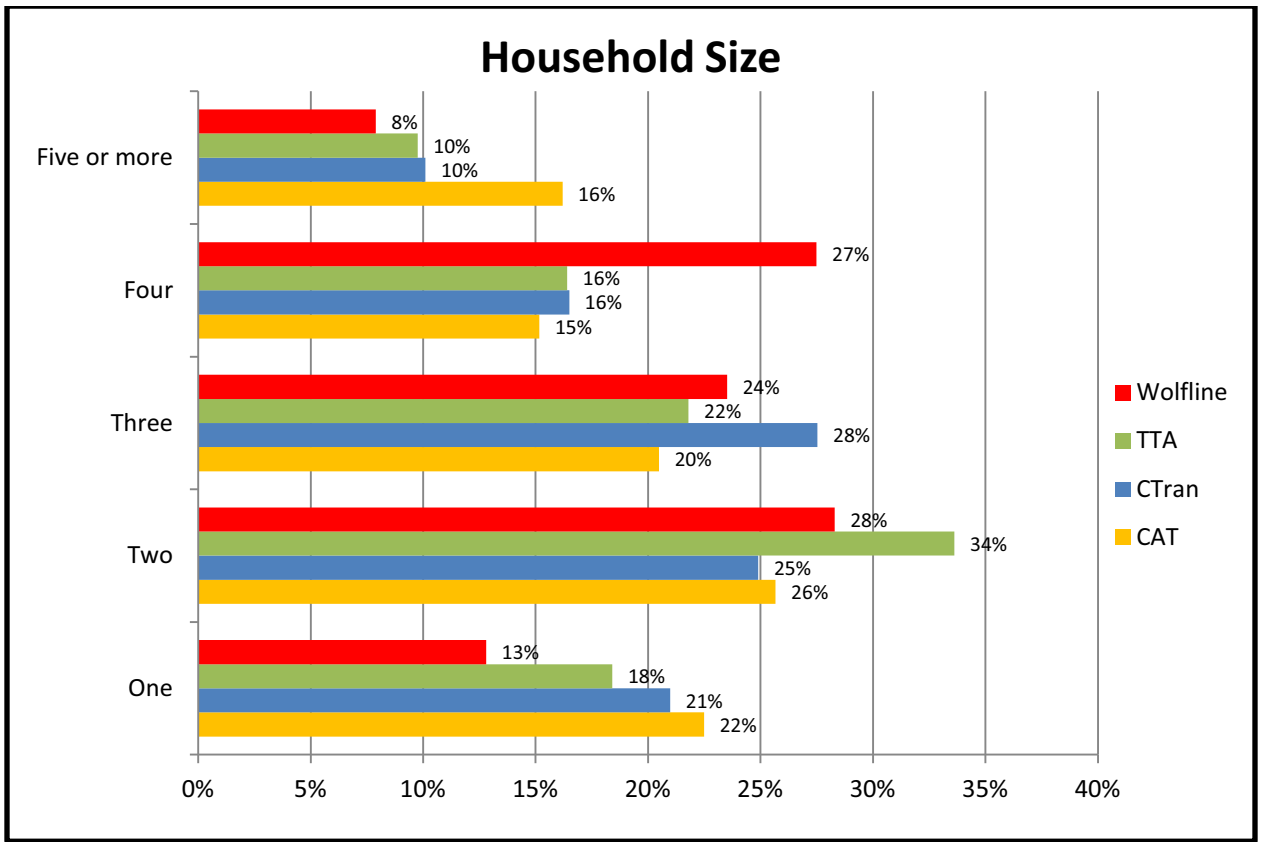
KEY FINDINGS

In general, transit use steadily decreased with increasing age. As expected, the Wolfline results were heavily influenced by the large undergraduate student population who use the system. CAT, CTran, and TTA had relatively proportional ridership among the age categories between age 16 and age 54, albeit with a slight decline as age increased.

Q18. How many people live in your home?*

*Question #13 on Wolfline survey form

1) One
2) Two
3) Three
4) Four
5) Five or more



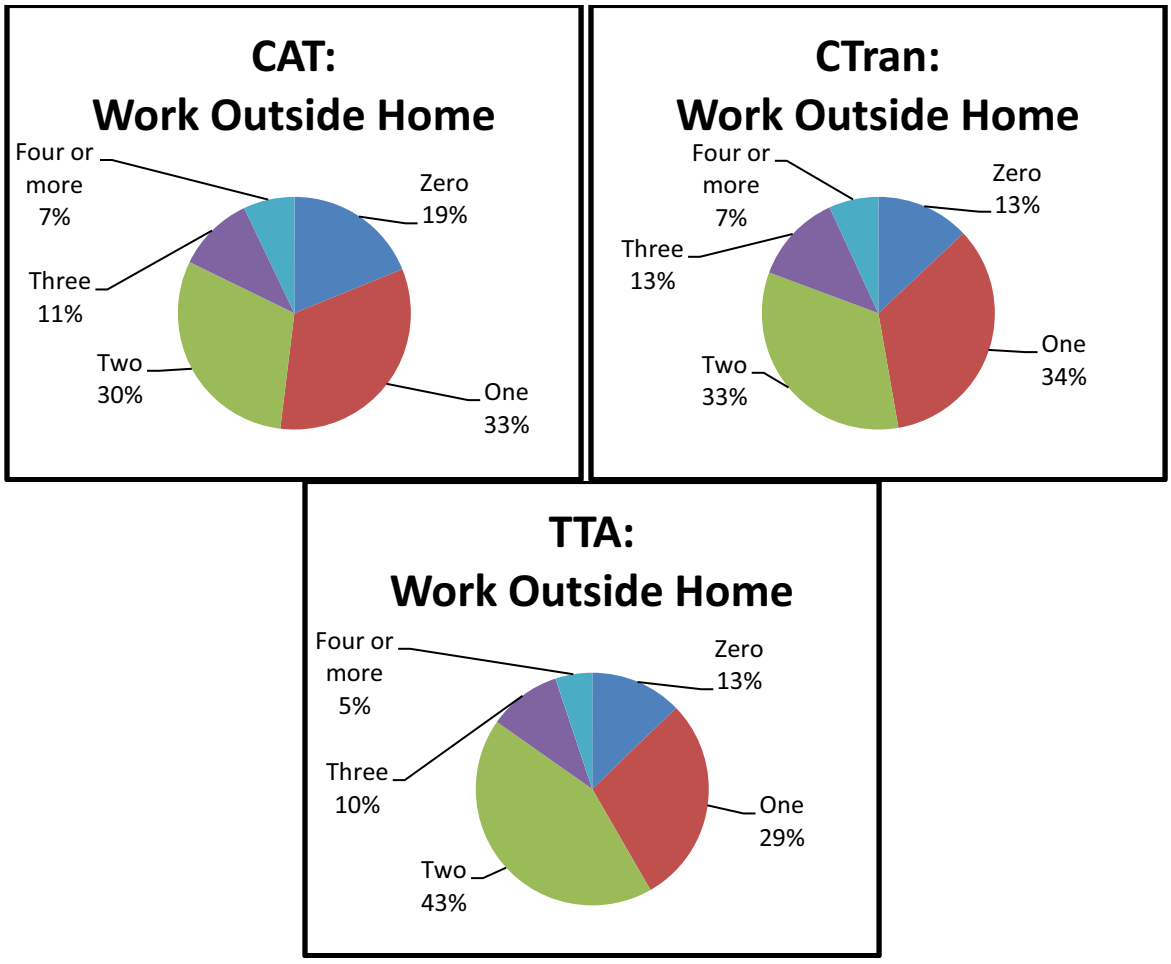
KEY FINDINGS

Across all four surveyed transit systems, most riders had two or three members in each household. Outside of these ranges, Wolfline had a high proportion of riders with a household size of four. This likely reflects the high proportion of students who use the service and are more likely to live in larger households.

Q19. How many people live in your home also work outside the home?*

*Question was not asked on Wolfline survey

1) Zero
2) One
3) Two
4) Three
5) Four or more



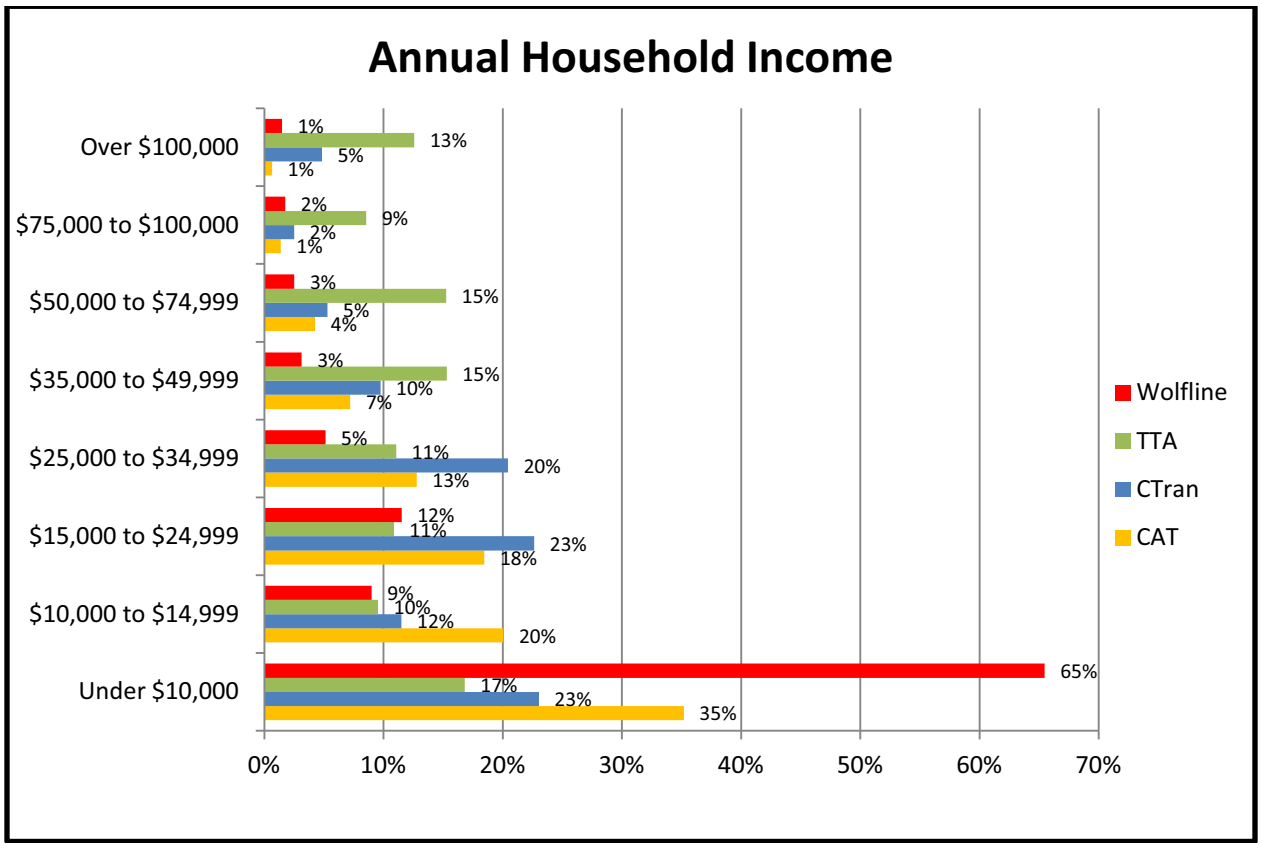
KEY FINDINGS

Consistent results were observed across CAT, CTran, and TTA, with the majority of surveyed riders responding between one and two household members. These results were also consistent with the survey question regarding household size, which indicated most riders having between two and three household members.

Q20. What is your annual household income?*

*Question #14 on Wolfline survey form

1) Under $10,000
2) $10,000 to $14,999
3) $15,000 to $24,999
4) $25,000 to $34,999
5) $35,000 to $49,999
6) $50,000 to $74,999
7) $75,000 to $100,000
8) Over $100,000



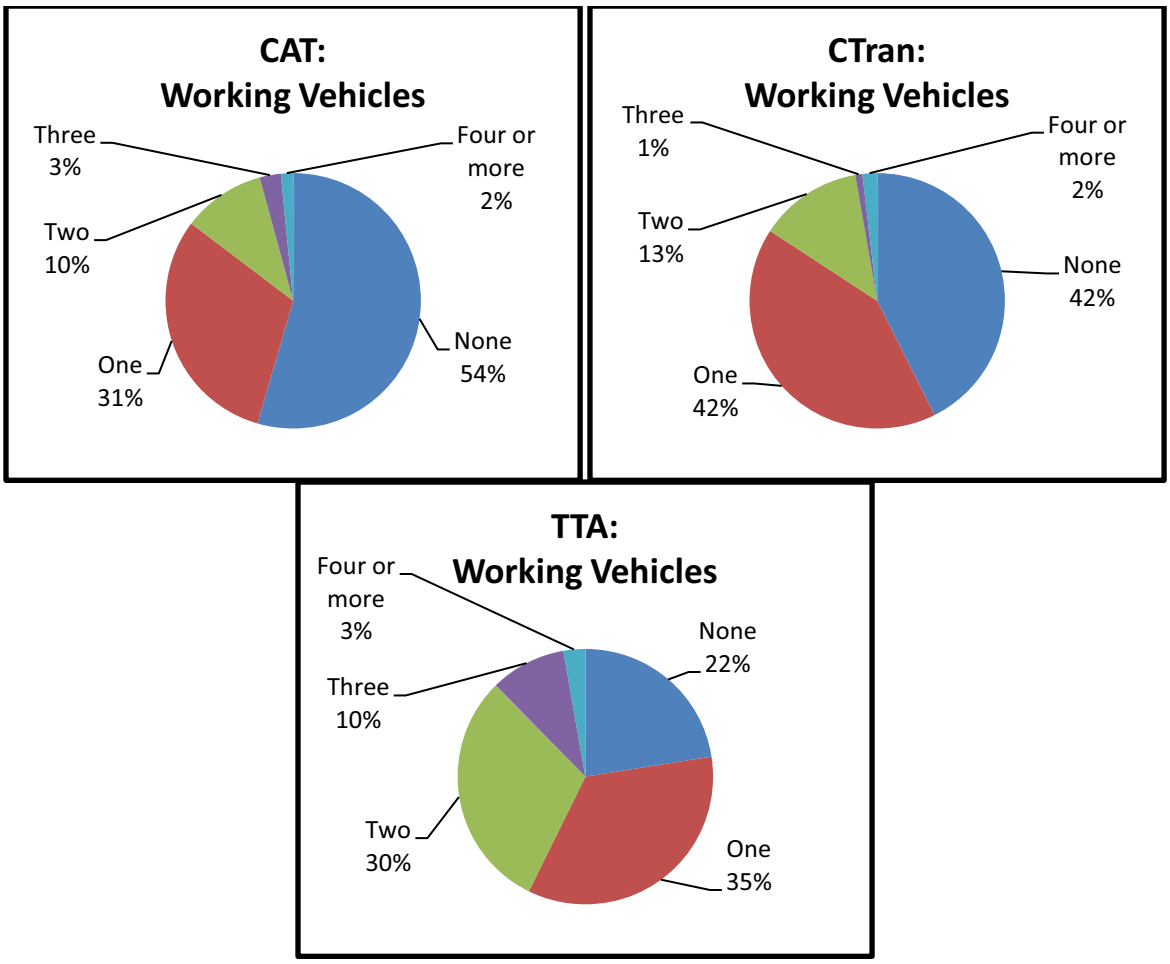
KEY FINDINGS

The majority of Wolfline riders reported an annual household income level of under $10,000, which is likely influenced by the high response rate of students. The majority of CAT riders reported annual household incomes of under $15,000 while CTran riders were under $25,000. TTA riders were divided in reported annual household income, with half making over $35,000 and the other half making under $35,000.

Q21. How many working vehicles are available in your home?*

*Question was not asked on Wolfline survey

1) None
2) One
3) Two
4) Three
5) Four or more



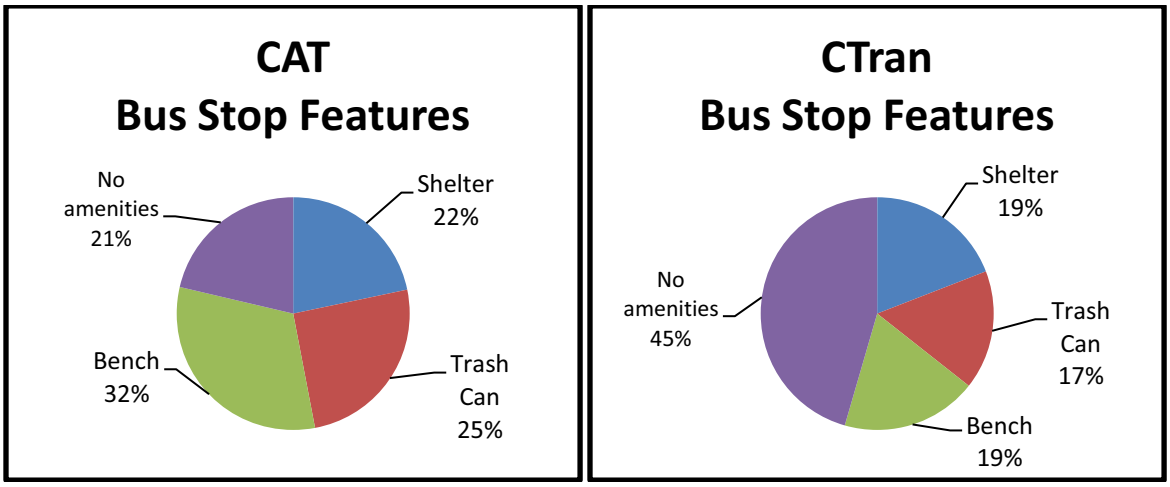
KEY FINDINGS

A majority of CAT riders reported no working vehicles while a plurality of CTran riders also reported no working vehicles. This is expected given that CAT and CTran's riders are more likely to be considered transit dependent as compared to TTA. For in TTA's case, the survey revealed under a quarter of riders reporting no working vehicles; thus illustrating the system's predominant choice rider market.

Q22. The bus stop where I got on has a…*

*Question was not asked on TTA or Wolfline survey

1) Shelter
2) Trash can
3) Bench
4) No amenities



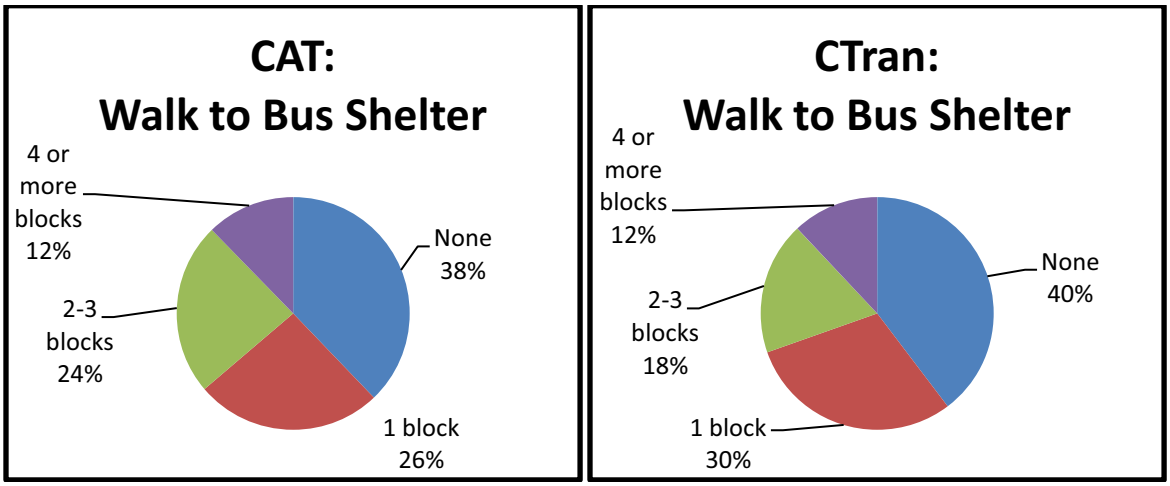
KEY FINDINGS

Results indicate that survey respondents who boarded CAT buses noted a larger share of bus stop amenities as compared to those who boarded CTran buses.

Q23. How much further would you walk to a bus stop with a shelter?*

*Question was not asked on TTA or Wolfline survey

1) None
2) 1 block
3) 2-3 blocks
4) 4 or more blocks

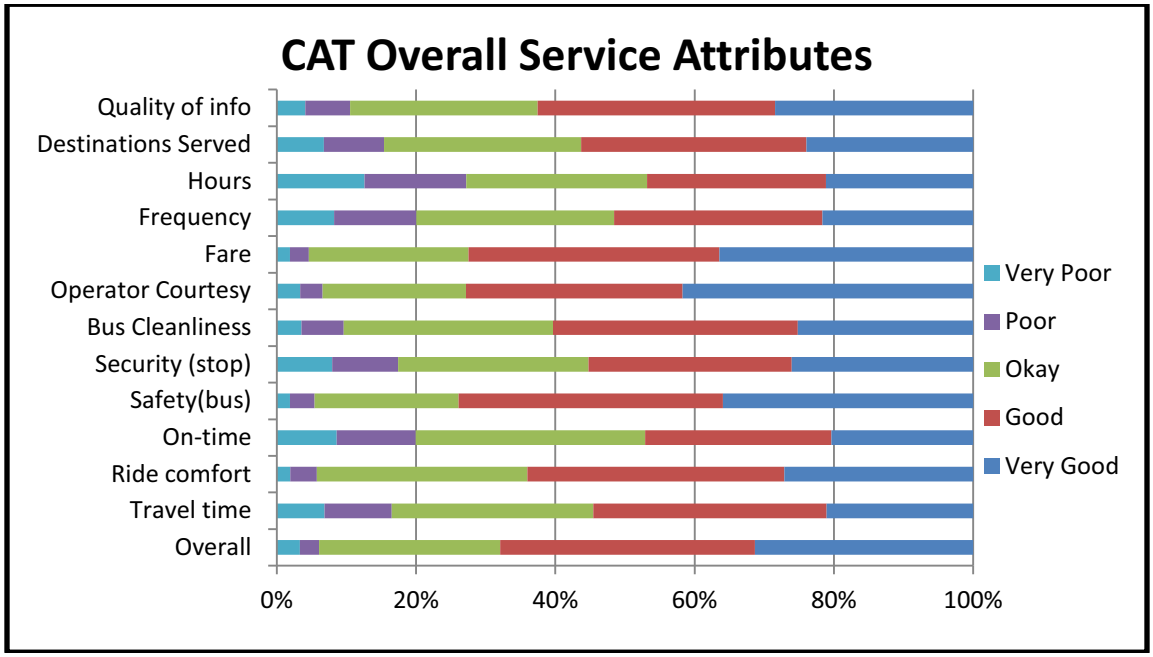


KEY FINDINGS

Similar results were found for both CAT and CTran surveyed riders, with a plurality of each stating that they would be unwilling to walk further to a bus stop with a shelter. However, about a half of the riders reported that they would be willing to walk between 1 to 3 blocks to reach a shelter.

Q24. CAT service attributes*

*Corresponds to question #24 on the CAT survey only



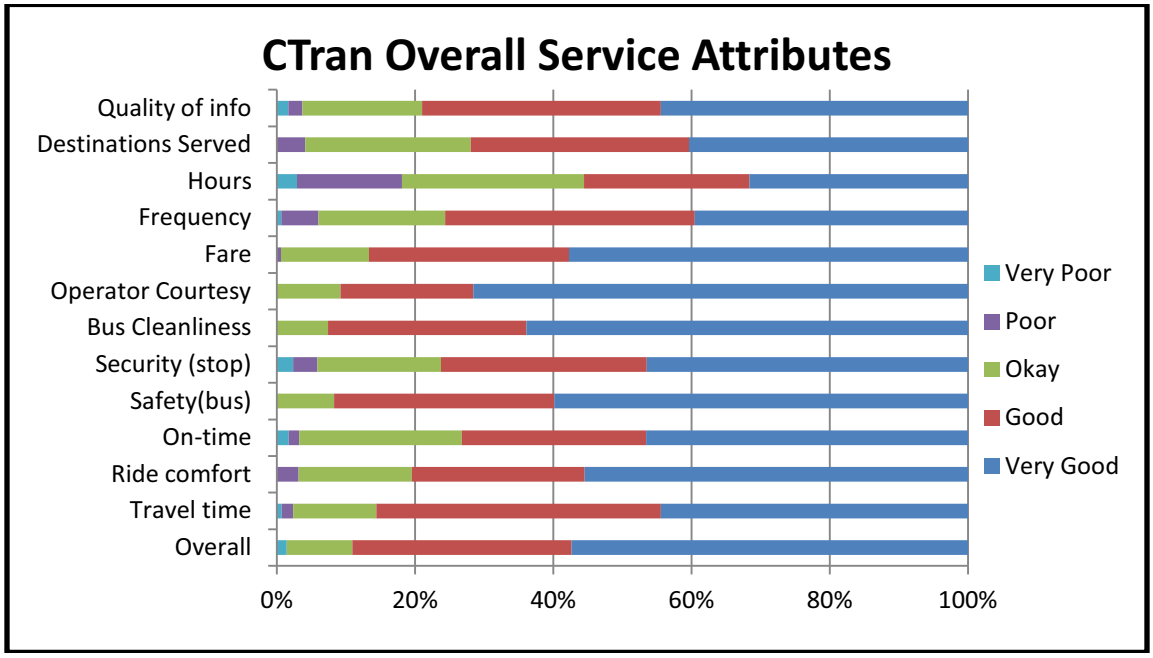
CAT Service Attributes

	Overall	Travel time	Ride comfort	On-time	Safety (bus)	Security (stop)	Bus Cleanli-ness	Operator Courtesy	Fare	Frequency	Hours	Destin-ations served	Quality of info
Very good	31%	21%	27%	20%	36%	26%	25%	42%	36%	22%	21%	24%	28%
Good	37%	33%	37%	27%	38%	29%	35%	31%	36%	30%	26%	32%	34%
Okay	26%	29%	30%	33%	21%	27%	30%	21%	23%	28%	26%	28%	27%
Poor	3%	10%	4%	11%	4%	9%	6%	3%	3%	12%	15%	9%	6%
Very poor	3%	7%	2%	9%	2%	8%	4%	3%	2%	8%	13%	7%	4%
Composite	**3.90**	**3.52**	**3.83**	**3.39**	**4.03**	**3.56**	**3.72**	**4.05**	**4.02**	**3.45**	**3.28**	**3.58**	**3.76**

KEY FINDINGS

Overall, riders were satisfied with CAT's bus services. On a scale of 1 to 5 with 1 being very poor and 5 being very good, the overall ranking is 3.90 (good). The median of the composite scores is 3.72. On a weighted basis, the top three scoring attributes are operator courtesy, safety on the bus, and fare. The three lowest scoring attributes are hours of service, on-time performance, and frequency of service.

Q24. CTran service attributes



CTRAN Service Attributes

	Overall	Travel time	Ride comfort	On-time	Safety (bus)	Security (stop)	Bus Cleanli-ness	Operator Courtesy	Fare	Frequency	Hours	Destin-ations served	Quality of info
Very good	57%	44%	55%	47%	60%	46%	64%	72%	58%	40%	32%	40%	44%
Good	32%	41%	25%	27%	32%	30%	29%	19%	29%	36%	24%	32%	35%
Okay	10%	12%	16%	24%	8%	18%	7%	9%	13%	18%	26%	24%	17%
Poor	0%	2%	3%	2%	0%	4%	0%	0%	1%	5%	15%	4%	2%
Very poor	1%	1%	0%	2%	0%	2%	0%	0%	0%	1%	3%	0%	2%
Composite	**4.44**	**4.27**	**4.33**	**4.15**	**4.52**	**4.14**	**4.56**	**4.62**	**4.44**	**4.08**	**3.66**	**4.08**	**4.18**

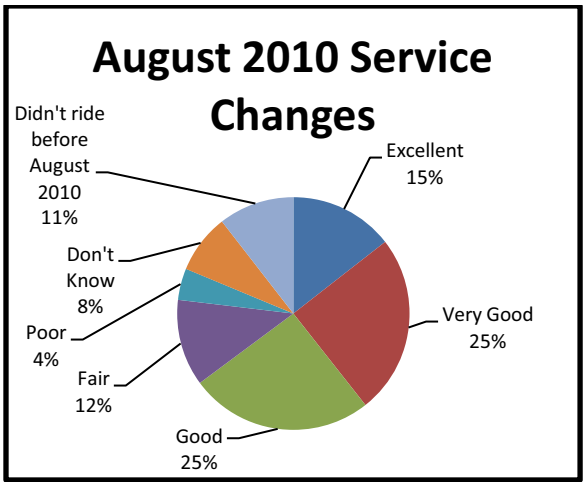
KEY FINDINGS

Riders were asked for their service rating for the CTran system as a whole and for several distinct aspects. Overall, riders were satisfied with CTran's bus services. On a scale of 1 to 5 with 1 being very poor and 5 being very good, the overall ranking is 4.44 (good to very good). The median of the composite scores is 4.27. On a weighted basis, the top three scoring attributes are operator courtesy, safety on the bus, and bus cleanliness. The three lowest scoring attributes are hours of service, frequency, and destinations served.

Q22. How would you rate the [TTA] August 2010 service changes?*

*Question was not asked on the CAT, CTran, or Wolfline survey
**Question #22 on TTA rider survey form only

1) Excellent
2) Very Good
3) Good
4) Fair
5) Poor
6) Don't know
7) Didn't ride before August 2010

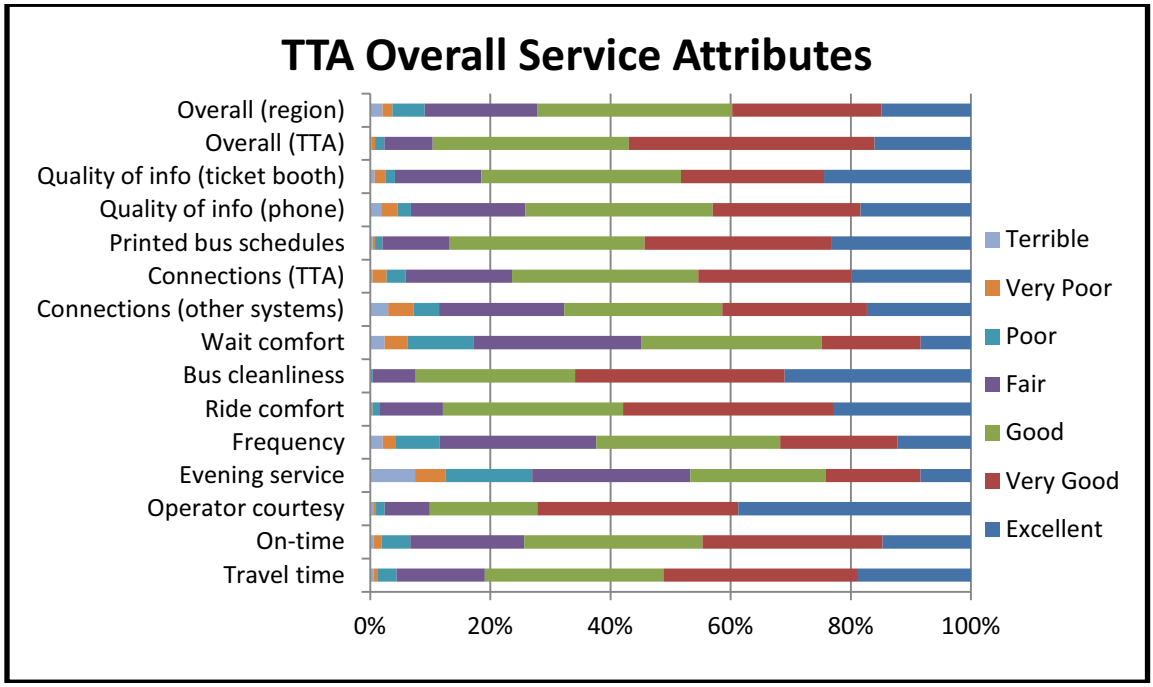


KEY FINDINGS

A majority of riders expressed a favorable view of the TTA August 2010 service changes, with 40% rating them as Very Good or Excellent. Only 16% rated them as Fair or Poor. Notably, 11% did not ride before August 2010, a scant three months before the survey was conducted. This high percentage could be reflective of new riders being attracted by the service changes.

Q24. TTA service attributes*

*Corresponds to question #24 on the CAT survey only. Note: TTA survey used a 7-point scale.



TTA Service Attributes

	Overall (area)	Overall (TTA)	Info (booth)	Info (phone)	Sche-dules	Connections (TTA)	Connections (other)	Comfort (wait)	Bus Clean-liness	Comfort (ride)	Freque-ncy	Evening service	Operator courtesy	On-time	Travel time
Excellent	15%	16%	24%	18%	23%	20%	17%	8%	31%	23%	12%	8%	39%	15%	19%
Very good	25%	41%	24%	25%	31%	26%	24%	16%	35%	35%	20%	16%	33%	30%	32%
Good	32%	33%	33%	31%	32%	31%	26%	30%	27%	30%	31%	23%	18%	30%	30%
Fair	19%	8%	14%	19%	11%	18%	21%	28%	7%	11%	26%	26%	8%	19%	15%
Poor	5%	2%	2%	2%	1%	3%	4%	11%	0%	1%	7%	14%	1%	5%	3%
Very poor	2%	1%	2%	3%	0%	2%	4%	4%	0%	0%	2%	5%	0%	1%	1%
Terrible	2%	0%	1%	2%	0%	0%	3%	2%	0%	0%	2%	7%	0%	1%	1%
Composite	**5.12**	**5.59**	**5.47**	**5.22**	**5.61**	**5.33**	**5.05**	**4.62**	**5.89**	**5.67**	**4.89**	**4.32**	**5.97**	**5.25**	**5.45**

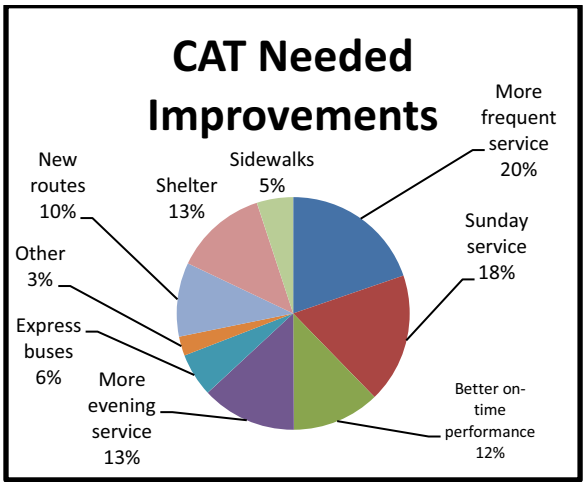
KEY FINDINGS

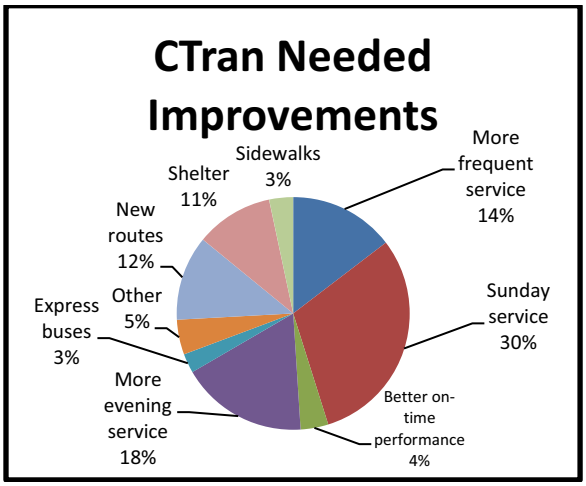
Riders were asked for their service rating for the TTA system as a whole and for several distinct aspects. Overall, riders were satisfied with TTA's bus services. On a scale of 1 to 7 with 1 being terrible and 7 being excellent, the overall ranking is 5.12 (good). The median of the composite scores is 5.33. On a weighted basis, the top three scoring attributes are operator courtesy, bus cleanliness, and ride comfort. The three lowest scoring attributes are frequency, wait comfort, and evening service hours.

Q25. Which bus service improvements are needed?*

*Question was not asked on TTA or Wolfline survey

1) More frequent service
2) Sunday service
3) Better on-time performance
4) More evening service
5) Express service
6) Other
7) New routes
8) Shelter
9) Sidewalks





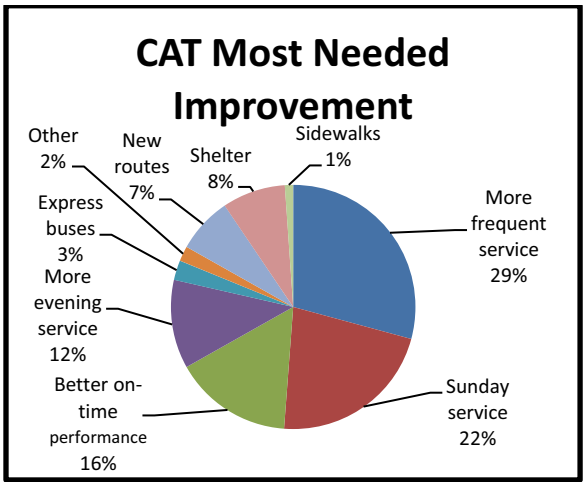
KEY FINDINGS

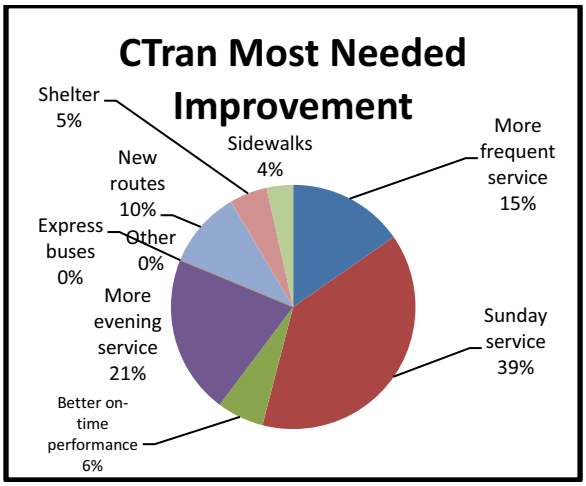
Suggested needed improvements were similar for CAT and CTran. The suggested improvements were centered on increasing the span-of-service and service days for the system. Specifically, surveyed riders' top three needed improvements for both systems included a desire for more frequent service, more Sunday service, and more evening service.

Q25A. Which is most needed?*

*Question was not asked on TTA or Wolfline survey

1) More frequent service
2) Sunday service
3) Better on-time performance
4) More evening service
5) Express service
6) Other
7) New routes
8) Shelter
9) Sidewalks





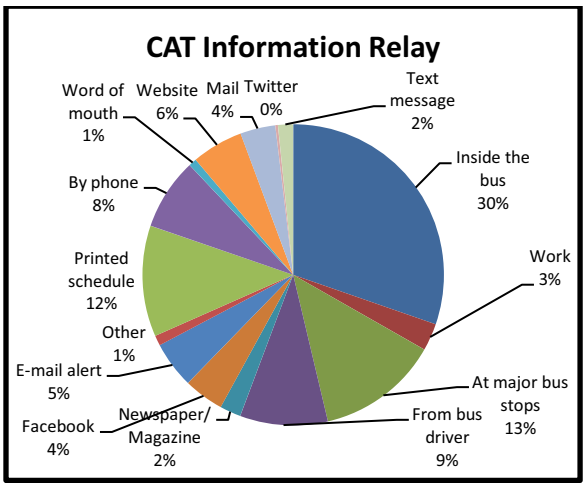
KEY FINDINGS

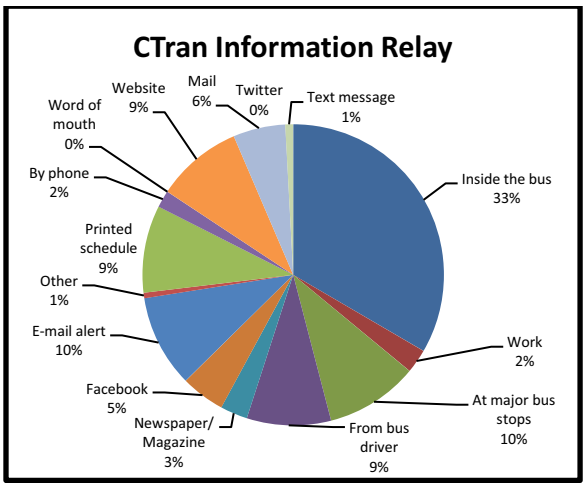
Generally, the most needed improvements were concentrated around increasing the span-of-service and service days for the system. A plurality of CAT riders selected more frequent service followed by more Sunday service and better on-time performance. For CTran, a plurality selected more Sunday service followed by more evening service and more frequent service.

Q26. How would you prefer to get information about [CAT/CTran]?*

*Question was not asked on TTA or Wolfline survey

1) Inside the bus (person)
2) Work (person)
3) At major stops (person)
4) From bus driver (person)
5) Newspaper/ magazine (traditional)
6) Facebook (new)
7) E-Mail alert (new)
8) Other
9) Printed schedule (traditional)
10) By phone (traditional)
11) Word of mouth (person)
12) Website (new)
13) Mail (traditional)
14) Twitter (new)
15) Text message (new)





KEY FINDINGS

CAT and CTran riders provided similar preferences for how they would prefer to receive information. A plurality in both systems responded that they would prefer to receive information inside the bus. Various information sources can be classified based on in-person, traditional (newspaper, phone, etc.), and new (Facebook, Twitter, etc.) media approaches. Both CAT (56%) and CTran (54%) riders preferred information sources classified as in-person approaches. However they differed in regards to traditional vs. new media approaches, with CAT (26% traditional vs. 17% new) riders favoring traditional and CTran (20% traditional vs. 25% new) riders favoring new media approaches.

Q38. Which of the rated items is most important to improve?*

*Includes responses to Question 38A, which asked: "Which of the rated items is second most important to improve?"
**Both questions were only asked on the TTA rider survey

1) Total travel time
2) Buses running on-time
3) Courtesy of bus operators
4) Extend evening service
5) Frequency of service
6) Comfort of the ride
7) Cleanliness of the bus
8) Comfort while waiting for bus
9) Connections with other systems
10) Connections with Triangle Transit
11) Printed bus schedules
12) 485-Ride telephone operators
13) Ticket office information
14) Overall Triangle Transit service
15) Overall area service

Improvement choice	% of respondents – most important	% of respondents – second most important	Average
Frequency of service	23.69%	20.88%	22.35%
Buses running on-time	22.57%	14.56%	18.75%
Extend evening service	18.25%	13.69%	16.07%
Comfort while waiting for the bus	7.49%	11.61%	9.45%
Total travel time	8.50%	9.06%	8.77%
Connections with other systems	7.91%	9.30%	8.57%
Courtesy of bus operators	2.65%	3.46%	3.04%
Connections with Triangle Transit	1.72%	3.77%	2.70%
Printed bus schedules	1.77%	2.78%	2.25%
485-Ride telephone operators	1.52%	2.68%	2.07%
Comfort of the ride	0.99%	2.76%	1.84%
Overall area service	1.95%	1.41%	1.69%
Ticket office information	0.85%	1.77%	1.29%
Cleanliness of the bus	0.14%	2.29%	1.16%
Overall Triangle Transit service	0.00%	0.00%	0.00%

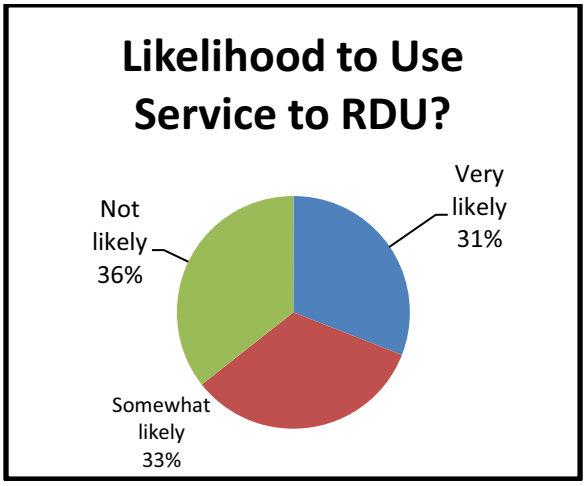
KEY FINDINGS

A plurality of riders selected frequency of service, which was followed closely by improving on-time performance and extending evening service hours as the most pressing improvements needed for TTA. As expected, results were similar to those found when riders identified the single most important improvement. A plurality of riders selected frequency of service, which was followed by improving on-time performance and extending evening service hours. Averaging responses across the most and second most needed improvements, these three choices continued to clearly stand out as needed improvements for TTA.

Q39. How likely are you to take the bus to RDU Airport now that there is a direct bus?*

*Question was not asked on the CAT, CTran, or Wolfline survey

1) Very likely
2) Somewhat likely
3) Not likely



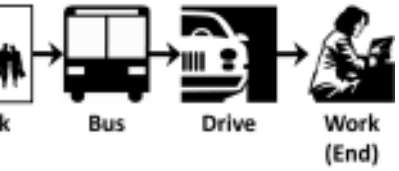
KEY FINDINGS

Riders were roughly evenly split between the choices, with a slight plurality reporting not being likely to use the service.

RIDER SURVEYS

our current one-way bus trip.

-way trip:



ou come from before you got on eck one)

university (student)
K-12 student)
nt
on/sightseeing
dental appointment
eligious worship, personal business
g

ddress of the place where you rip?

ding name:

r Walmart)

oss streets:

Main or Capital & Brentwood)

ou board this bus?

or name of transit center

e Square or Rock Quarry & Crosslink)

sfer to get to this bus?

o

4a. If "yes", what transit system did you come from?

- ☐ Triangle Transit
- ☐ Raleigh CAT
- ☐ Durham DATA
- ☐ Chapel Hill Transit
- ☐ NCSU Wolfline
- ☐ Cary C-Tran
- ☐ Duke Transit
- ☐ Other _____

4b. Which route name/number?

_____

5. How did you get to your first bus? (check one)

- ☐ Walked (# of blocks ____)
- ☐ Rode a bicycle (# of miles ____)
- ☐ Drove and parked (# of miles ____)
- ☐ Dropped off
- ☐ Other _____

6. Where are you going now? (check one)

- ☐ Work
- ☐ College/university (student)
- ☐ School (K-12 student)
- ☐ Restaurant
- ☐ Recreation/sightseeing
- ☐ Medical/dental appointment
- ☐ Social, religious worship, personal business
- ☐ Home
- ☐ Shopping
- ☐ Other _____

7. What is the address of the place where you are going?

Place or building name:

_____

Address or cross streets:

_____

City:_____

8. Where will you get off this bus?

Cross streets or name of transit center

_____

9. Will you transfer when you get off this bus?

☐ Yes ☐ No

9a. If "yes", what transit system will you transfer to?

- ☐ Triangle Transit
- ☐ Raleigh CAT
- ☐ Durham DATA
- ☐ Chapel Hill Transit
- ☐ NCSU Wolfline
- ☐ Cary C-Tran
- ☐ Duke Transit
- ☐ Other _____

9b. Which route name/number?

_____

10. How will you get to where you are going when you get off your last bus? (check one)

- ☐ Walk (# of blocks ____)
- ☐ Ride a bicycle (# of miles ____)
- ☐ Drive (# of miles ____)
- ☐ Be picked up
- ☐ Other _____

Tell us about your transit use.

11. How often do you ride the bus?

- ☐ 6-7 days a week
- ☐ 5 days a week
- ☐ 3-4 days a week
- ☐ 1-2 days a week
- ☐ once or twice a month
- ☐ less than once a month

12. How long have you been riding CAT?

- ☐ First time rider
- ☐ Less than 1 year
- ☐ 1-2 years
- ☐ 3-4 years
- ☐ More than 4 years

13. How did you pay your bus fare? (check one)

- ☐ Cash Fare
- ☐ 10 or 11 Ride Pass
- ☐ 31-day Pass
- ☐ Day Pass
- ☐ Weekly Pass
- ☐ Go Pass
- ☐ Other _____

14. Why are you using the bus for t all that apply)

- ☐ I prefer the bus over my car
- ☐ I choose to ride instead of o
- ☐ The bus is my only option
- ☐ To save money on driving co
- ☐ My employer helps pay the
- ☐ I ride for free with Go Pass
- ☐ Better for the environment
- ☐ Other _____

15. If transit service were not availa you make this trip? (check one)

- ☐ Use car
- ☐ Bicycle
- ☐ Use a taxi
- ☐ Ride with
- ☐ Walk
- ☐ I would no

Tell us about yourself.

All personal information is confi not be shared or sold.

16. I am:

- ☐ Male ☐ Female

- ☐ Black/African American
- ☐ White/Non-Hispanic
- ☐ Native American
- ☐ Hispanic/Latino
- ☐ Asian American
- ☐ Other _____

17. What is your age?

_____years

18. Including yourself, how many p home?

☐ 1 ☐ 2 ☐ 3 ☐ 4

19. Including yourself, how many p your home also work outside th

☐ 0 ☐ 1 ☐ 2 ☐ 3

annual household income?

0,000 ☐ $35,000- $49,999
$14,999 ☐ $50,000- $74,999
$24,999 ☐ $75,000- $100,000
$34,999 ☐ Over $100,000

orking cars/trucks are available in

☐ 2 ☐ 3 ☐ 4 or more

ou think about CAT's services.

where I got on this bus has a (check)

☐ Bench
☐ No amenities

rther would you walk to wait at a a shelter?

would not ☐ 2-3 blocks
her
☐ 4 or more blocks

services:

	Very Good	Good	Fair	Poor	Very Poor	Don't Know
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
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n	☐	☐	☐	☐	☐	☐
ed	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

25. Which bus service improvements are needed? (check all that apply)

25a. Please circle the ONE most important improvement

☐ More frequent service
☐ Sunday service
☐ Better on-time performance
☐ More evening service
☐ Express buses
☐ Other_____
☐ New routes
☐ Shelters
☐ Sidewalks

26. How would you prefer to get CAT information?

☐ Inside the bus
☐ Work
☐ At major bus stops
☐ From bus driver
☐ Newspaper/Magazine
☐ Facebook
☐ E-mail alert
☐ Other _____
☐ Printed schedule
☐ By phone
☐ Word of mouth
☐ Website
☐ Mail
☐ Twitter
☐ Text message

27. Other comments about your transit experience:

_____

_____

_____

_____

_____

If you would like to enter a drawing for an iPod touch®, give us your contact information below:

Name: _____

Address, City, Zip: _____

Email: _____

Thanks again for your help.

Capital Area Transit is planning to improve its service!
YOU can help us by completing this questionnaire about your current trip, and returning it to the surveyor on board this bus.

If you complete this form and give us your name and contact information, you'll be eligible to enter a drawing for an I-pod Touch® or other prize.

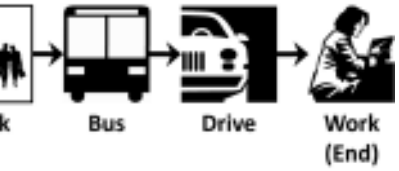
Even if you have already completed one on a previous trip, we would appreciate your completing this questionnaire again.

Thank you for your participation.

Sincerely, Capital Area Transit – CAT

our current one-way bus trip.

-way trip:



ou come from before you got on eck one)

university (student)
K-12 student)
nt
on/sightseeing
dental appointment
eligious worship, personal business
g

ddress of the place where you rip?

ding name:

ent Commons)

oss streets:

Main or Kildaire Farm & Maynard)

ou board this bus?

or name of transit center

rain Station or High House & Davis)

sfer to get to this bus?

o

4a. If "yes", what transit system did you come from?

- ☐ Triangle Transit
- ☐ Raleigh CAT
- ☐ Durham DATA
- ☐ Chapel Hill Transit
- ☐ NCSU Wolfline
- ☐ Cary C-Tran
- ☐ Duke Transit
- ☐ Other _____

4b. Which route name/number?

_____

5. How did you get to your first bus? (check one)

- ☐ Walked (# of blocks ____)
- ☐ Rode a bicycle (# of miles ____)
- ☐ Drove and parked (# of miles ____)
- ☐ Dropped off
- ☐ Other _____

6. Where are you going now? (check one)

- ☐ Work
- ☐ College/university (student)
- ☐ School (K-12 student)
- ☐ Restaurant
- ☐ Recreation/sightseeing
- ☐ Medical/dental appointment
- ☐ Social, religious worship, personal business
- ☐ Home
- ☐ Shopping
- ☐ Other _____

7. What is the address of the place where you are going?

Place or building name:

_____

Address or cross streets:

_____

City:_____

8. Where will you get off this bus?

Cross streets or name of transit center

_____

9. Will you transfer when you get off this bus?

☐ Yes ☐ No

9a. If "yes", what transit system will you transfer to?

- ☐ Triangle Transit
- ☐ Raleigh CAT
- ☐ Durham DATA
- ☐ Chapel Hill Transit
- ☐ NCSU Wolfline
- ☐ Cary C-Tran
- ☐ Duke Transit
- ☐ Other _____

9b. Which route name/number?

_____

10. How will you get to where you are going when you get off your last bus? (check one)

- ☐ Walk (# of blocks ____)
- ☐ Ride a bicycle (# of miles ____)
- ☐ Drive (# of miles ____)
- ☐ Be picked up
- ☐ Other _____

Tell us about your transit use.

11. How often do you ride the bus?

- ☐ 6-7 days a week
- ☐ 5 days a week
- ☐ 3-4 days a week
- ☐ 1-2 days a week
- ☐ once or twice a month
- ☐ less than once a month

12. How long have you been riding C-Tran?

- ☐ First time rider
- ☐ Less than 1 year
- ☐ 1-2 years
- ☐ 3-4 years
- ☐ More than 4 years

13. How did you pay your bus fare? (check one)

- ☐ Cash Fare
- ☐ 10 or 11 Ride Pass
- ☐ Monthly Pass
- ☐ Other _____
- ☐ Day Pass
- ☐ Go Pass

14. Why are you using the bus for t all that apply)

- ☐ I prefer the bus over my car
- ☐ I choose to ride instead of o
- ☐ The bus is my only option
- ☐ To save money on driving co
- ☐ My employer helps pay the
- ☐ I ride for free with Go Pass
- ☐ Better for the environment
- ☐ Other _____

15. If transit service were not availa you make this trip? (check one)

- ☐ Use car
- ☐ Bicycle
- ☐ Use a taxi
- ☐ Ride with
- ☐ Walk
- ☐ I would no

Tell us about yourself.

All personal information is confi not be shared or sold.

16. I am:

- ☐ Male ☐ Female

- ☐ Black/African American
- ☐ White/Non-Hispanic
- ☐ Native American
- ☐ Hispanic/Latino
- ☐ Asian American
- ☐ Other _____

17. What is your age?

_____years

18. Including yourself, how many p home?

☐ 1 ☐ 2 ☐ 3 ☐ 4

19. Including yourself, how many p your home also work outside th

☐ 0 ☐ 1 ☐ 2 ☐ 3

annual household income?

10,000 ☐ $35,000- $49,999
$14,999 ☐ $50,000- $74,999
$24,999 ☐ $75,000- $100,000
$34,999 ☐ Over $100,000

orking cars/trucks are available in

☐ 2 ☐ 3 ☐ 4 or more

u think about C-Tran's service.

where I got on this bus has a (check)

☐ Bench
n ☐ No amenities

rther would you walk to wait at a a shelter?

vould not ☐ 2-3 blocks
her
☐ 4 or more blocks

ran services:

	Very Good	Good	Fair	Poor	Very Poor	Don't Know
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
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	☐	☐	☐	☐	☐	☐
n	☐	☐	☐	☐	☐	☐
ed	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

25. Which bus service improvements are needed? (check all that apply)

25a. Please circle the ONE most important improvement

☐ More frequent service
☐ Sunday service
☐ Better on-time performance
☐ More evening service
☐ Express buses
☐ Other_____
☐ New routes
☐ Shelters
☐ Sidewalks

26. How would you prefer to get C-Tran information?

☐ Inside the bus
☐ Work
☐ At major bus stops
☐ From bus driver
☐ Newspaper/Magazine
☐ Facebook
☐ E-mail alert
☐ Other _____
☐ Printed schedule
☐ By phone
☐ Word of mouth
☐ Website
☐ Mail
☐ Twitter
☐ Text message

27. Other comments about your transit experience:

_____

_____

_____

_____

_____

If you would like to enter a drawing for an iPod touch®, give us your contact information below:

Name: _____

Address, City, Zip: _____

Email: _____

Thanks again for your help.

C-Tran is planning to improve its service!
YOU can help us by completing this questionnaire about your current trip, and returning it to the surveyor on board this bus.

If you complete this form and give us your name and contact information, you'll be eligible to enter a drawing for an I-pod Touch® or other prize.

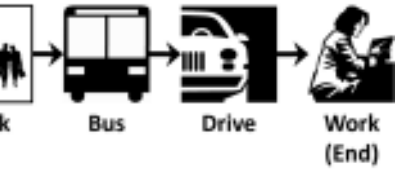
Even if you have already completed one on a previous trip, we would appreciate your completing this questionnaire again.

Thank you for your participation.

Sincerely, C-Tran

our current one-way bus trip.

ple of a one-way bus trip.



ou come from before you got on eck one)

- university (student)
- K-12 student)
- nt
- on/sightseeing
- dental appointment
- eligious worship, personal business
- g

_____

address of the place where you rip?

ding name:

_____

r Walmart)

oss streets:

_____

Main or Capital & Brentwood)

_____

ou board this bus?

or name of transit center

_____

e Square or Rock Quarry & Crosslink)

sfer to get to this bus?

o

4a. If "yes", what transit system did you come from?

- ☐ Triangle Transit
- ☐ Raleigh CAT
- ☐ Durham DATA
- ☐ Chapel Hill Transit
- ☐ NCSU Wolfline
- ☐ Cary C-Tran
- ☐ Duke Transit
- ☐ Other _____

4b. Which route name/number?

_____

5. How did you get to your first bus? (check one)

- ☐ Walked (# of blocks ____)
- ☐ Rode a bicycle (# of miles ____)
- ☐ Drove and parked (# of miles ____)
- ☐ Dropped off
- ☐ Other _____

6. Where are you going now? (check one)

- ☐ Work
- ☐ College/university (student)
- ☐ School (K-12 student)
- ☐ Restaurant
- ☐ Recreation/sightseeing
- ☐ Medical/dental appointment
- ☐ Social, religious worship, personal business
- ☐ Home
- ☐ Shopping
- ☐ Other _____

7. What is the address of the place where you are going?

Place or building name:

_____

Address or cross streets:

_____

City:_____

8. Where will you get off this bus?

Cross streets or name of transit center

_____

9. Will you transfer when you get off this bus?

☐ Yes ☐ No

9a. If "yes", what transit system will you transfer to?

- ☐ Triangle Transit
- ☐ Raleigh CAT
- ☐ Durham DATA
- ☐ Chapel Hill Transit
- ☐ NCSU Wolfline
- ☐ Cary C-Tran
- ☐ Duke Transit
- ☐ Other _____

9b. Which route name/number?

_____

10. How will you get to where you are going when you get off your last bus? (check one)

- ☐ Walk (# of blocks ____)
- ☐ Ride a bicycle (# of miles ____)
- ☐ Drive (# of miles ____)
- ☐ Be picked up
- ☐ Other _____

Tell us about your transit use.

11. How often do you ride Triangle Transit?

- ☐ 6-7 days a week
- ☐ 5 days a week
- ☐ 3-4 days a week
- ☐ 1-2 days a week
- ☐ once or twice a month
- ☐ less than once a month

12. How long have you been riding Triangle Transit?

- ☐ First time rider
- ☐ Less than 1 year
- ☐ 1-2 years
- ☐ 3-4 years
- ☐ More than 4 years

13. How did you pay your bus fare? (check one)

- ☐ One-way cash fare
- ☐ Disabled one-way cash fare
- ☐ $25 value card
- ☐ Triangle Transit 10-ride pass
- ☐ Other _____
- ☐ Day pass
- ☐ 5-day pass
- ☐ 31-day pass
- ☐ GoPass

14. Why are you using the bus for this trip? (check all that apply)

- ☐ I prefer the bus over my car
- ☐ I choose to ride instead of owning a car
- ☐ The bus is my only option
- ☐ To save money on driving co
- ☐ My employer helps pay the
- ☐ I ride for free with GoPass
- ☐ Better for the environment
- ☐ Other _____

15. If transit service were not availa you make this trip? (check one)

- ☐ Use car
- ☐ Bicycle
- ☐ Use a taxi
- ☐ Ride with
- ☐ Walk
- ☐ I would no

Tell us about yourself.

All personal information is confi not be shared or sold.

16. I am:

☐ Male ☐ Female

- ☐ Black/African American
- ☐ White/Non-Hispanic
- ☐ Native American
- ☐ Hispanic/Latino
- ☐ Asian American
- ☐ Other _____

17. What is your age?

_____years

18. Including yourself, how many p home?

☐ 1 ☐ 2 ☐ 3 ☐ 4

19. Including yourself, how many p your home also work outside th

☐ 0 ☐ 1 ☐ 2 ☐ 3

20. What is your annual household

- ☐ Under $10,000
- ☐ $10,000- $14,999
- ☐ $15,000- $24,999
- ☐ $25,000- $34,999
- ☐ $3
- ☐ $5
- ☐ $7
- ☐ Ov

orking cars/trucks are available in your home?

☐ 2 ☐ 3 ☐ 4 or more

ou think about Triangle Transit's services.

sit had major service changes in August 2010. Overall, how would you rate the service

☐ Good ☐ Poor ☐ Didn't Ride Before Aug. 2010
od ☐ Fair ☐ Don't Know

ys, how would you rate Triangle Transit on the following factors?

	Excellent	Very Good	Good	Fair	Poor	Very Poor	Terrible	Don't Know or Don't Use
ne, door to door	☐	☐	☐	☐	☐	☐	☐	☐
on-time	☐	☐	☐	☐	☐	☐	☐	☐
s operators	☐	☐	☐	☐	☐	☐	☐	☐
Transit buses stop running in evening	☐	☐	☐	☐	☐	☐	☐	☐
ervice	☐	☐	☐	☐	☐	☐	☐	☐
ride	☐	☐	☐	☐	☐	☐	☐	☐
the bus	☐	☐	☐	☐	☐	☐	☐	☐
waiting for the bus	☐	☐	☐	☐	☐	☐	☐	☐
etween Triangle Transit and other local T, DATA, NCSU, C-Tran, Duke, Wolfline)	☐	☐	☐	☐	☐	☐	☐	☐
etween Triangle Transit buses	☐	☐	☐	☐	☐	☐	☐	☐
o understand the printed bus schedules	☐	☐	☐	☐	☐	☐	☐	☐
ormation from 485-RIDE telephone	☐	☐	☐	☐	☐	☐	☐	☐
ormation from staff at the ticket office l Transit Center	☐	☐	☐	☐	☐	☐	☐	☐
do you rate Triangle Transit?	☐	☐	☐	☐	☐	☐	☐	☐
do you rate transit service in the region, the bus systems?	☐	☐	☐	☐	☐	☐	☐	☐

es listed above, which would be the *two most important* to improve? Please write in the nbers.

tant _____ Next most important

e you to take the bus to RDU Airport now that there is a direct bus from downtown Raleigh?

ery likely ☐ Somewhat likely ☐ Not likely

ents about your transit experience:

Triangle Transit is working with Capital Area Transit to improve transit service in Wake County!
YOU can help us by completing this questionnaire about your current trip, and returning it to the survey boxes on board this bus.

Even if you have already completed one on a previous trip, we would appreciate your completing this questionnaire again.

Thank you for your cooperation.

Sincerely,
Capital Area Transit – CAT
and
Triangle Transit

NC State is working with other transit partners in the region to improve services including the Wolfline!

YOU can help us by completing this questionnaire about your current trip, and returning it to the surveyor on board this bus.

Even if you have already completed one on a previous trip, we would appreciate your completing this questionnaire again.

Thank you for your participation.

Sincerely, NC State Wolfline

NC STATE UNIVERSITY

Tell us about your current one-way trip.

1. Where did you come from before you got on this bus? (check one)

- ☐ Work
- ☐ College/university (as a student)
- ☐ Medical/dental appointment
- ☐ Social, worship, personal business
- ☐ Home
- ☐ Other _____

2. How did you get to this bus? (check one)

- ☐ Walked
- ☐ Rode a bicycle
- ☐ Drove and parked
- ☐ Dropped off
- ☐ Transferred from another campus or City bus (which route? _____)
- ☐ Other _____

3. What is the address of the place where you started this trip?

Place or building name:

_____

(such as Hill Library, Centennial Campus)

Address or cross streets:

_____

(such as 123 Varsity or Gorman & Kings)

City: _____

4. Where are you going now? (check one)

- ☐ Work
- ☐ College/university (as a student)
- ☐ Medical/dental appointment
- ☐ Social, worship, personal business
- ☐ Home
- ☐ Other _____

5. What is the address of the place where you are going?

Place or building name:

_____

Address or cross streets:

_____

City:_____

6. How will you get to where you are going when you get off this bus? (check one)

- ☐ Walk
- ☐ Ride a bicycle
- ☐ Drive
- ☐ Be picked up
- ☐ Transfer to another campus or City bus (which route? _____)
- ☐ Other _____

Tell us about your transit use.

7. How often do you ride the bus?

- ☐ 6-7 days a week
- ☐ 5 days a week
- ☐ 3-4 days a week
- ☐ 1-2 days a week
- ☐ once or twice a month
- ☐ less than once a month

8. How long have you been riding Wolfline?

- ☐ First time rider
- ☐ Less than 1 year
- ☐ 1-2 years
- ☐ 3-4 years
- ☐ More than 4 years

9. Why are you using the bus for this trip? (check all that apply)

- ☐ I prefer the bus over my car
- ☐ I choose to ride the bus instead of owning a car
- ☐ The bus is my only option
- ☐ To save money on driving/parking costs
- ☐ My employer helps pay the fare
- ☐ I ride for free with Go Pass
- ☐ Better for the environment
- ☐ Other _____

10. If transit service were not available, how would you make this trip? (check one)

- ☐ Use car
- ☐ Carpool or vanpool
- ☐ Bicycle
- ☐ Walk
- ☐ Use a taxi
- ☐ I would not make this trip

Tell us about yourself.

All personal information is confidential and will not be shared or sold.

11. I am:

- ☐ Male ☐ Female

- ☐ Black/African American
- ☐ White/Non-Hispanic
- ☐ Native American
- ☐ Hispanic/Latino
- ☐ Asian American
- ☐ Other _____

12. What is your age?

_____years

13. Including yourself, how many people live in your home?

- ☐ 1 ☐ 2 ☐ 3 ☐ 4
- ☐ 5 or more

14. What is your annual income?

- ☐ Under $10,000
- ☐ $10,000- $14,999
- ☐ $15,000- $24,999
- ☐ $25,000- $34,999
- ☐ $35,000- $49,999
- ☐ $50,000- $74,999
- ☐ $75,000- $100,000
- ☐ Over $100,000

15. Other comments about your transit experience:

_____

_____

_____

_____

Thank you for your participation.

TECHNICAL MEMORANDUM #2
2010 Capital Area Bus Transit Boarding & Alighting Count

TECHNICAL MEMORANDUM #2

From: HDR Engineering, Inc. of the Carolinas Consulting Team (HDR)

To: Capital Area Bus Transit Development Plan Steering Committee & CAMPO Technical Coordinating Committee

Date: September 30, 2011

Topic: 2010 Capital Area Bus Transit Boarding & Alighting Count

1 Introduction

One of the major elements of the Capital Area Bus Transit Development Plan involved conducting a complete ridership count for all Capital Area Transit (CAT) and Cary Transit (CTran) routes. The intent of counting each route's boarding and alighting activity is to better understand existing ridership trends. Conducting a complete boarding and alighting count is one of the most intensive data gathering efforts a system can do since it requires a counter to be on the bus during all hours of operation over the course of a single day. However, this also allows other information beyond the boarding and alighting activity to be collected as well. This includes data on passenger max load capacities, on-time performance, and the ability to identify major activity centers based on stop-level boarding and alighting information.

2 Methodology

The boarding and alighting count was completed aboard all existing CAT and CTran routes. AJM Consulting (AJM) of the HDR Team was responsible for collecting the stop-by-stop ride-checks. An equivalent one-day sample was collected for each route on weekdays and Saturdays. Ride checkers were aboard each bus and recorded all boardings and alightings for each stop on a trip-by-trip basis. The schedule adherence for the routes was also recorded by noting the time each trip passed a timepoint.

For CAT, a weekday boarding and alighting count was completed the week of September 13, 2010 through September 17, 2010. Overall, a total of 9 trips out of 1,178 total trips (0.8%) were missed. Two trips were missed because of a bus breakdown with seven trips missed due to the bus running late. Also, route 40E (Wake Tech Express), R-Line, and the Wake Forest Loop route were not surveyed due to budget constraints. Route 31 (New Hope Commons) and Route 34 (Wake Med-Poole) were not surveyed as they are not weekday routes. A CAT weekend boarding and alighting count was completed on three Saturday's on September 11, 2010, September 18, 2010, and September 25, 2010. A total of 5 out of 795 trips (0.6%) were missed, including three trips missed due to bus breakdowns and two trips due to late buses.

The CTran weekday boarding and alighting count was conducted on October 29, 2010 and November 4, 2010. A total of two trips were missed due to a passenger injury. A CTran weekend boarding and alighting count was completed on two Saturday's, October 30, 2010 and November 6, 2010. A total of three trips were missed, which includes two trips due to the bus running late and one trip late due to a train delay.

3 Boarding and Alighting Ridership Analysis

3.1 Daily Ridership

Daily ridership, defined as total boardings, is presented for CAT and CTran for both an average weekday and Saturday. Assessing individual route ridership is a critical quality of service metric for transit agencies. Decisions based on daily ridership impact passengers and the agency as a whole. For passengers, adjustments based on existing ridership may result in expansions of service, reductions in service, or new route alignments. For agencies, these service change decisions, based on ridership data, not only influence the availability of transit but also have a direct bearing on the financial performance of the system as a whole.

For CAT and CTran routes, ride checkers counted all riders who boarded each bus and recorded where they got off in order to identify active destination locations. Individual route data is provided detailing ons (boardings) and offs (alightings). For CAT weekday data, a comparison is made to a similar boarding and alighting count survey completed in 2008. In addition, both CAT and CTran weekday ridership numbers include comparisons to the recently released fiscal year (FY) 2010-2011 official farebox data.

3.1.1 CAT

3.1.1.1 CAT Weekday Ridership

CAT weekday ridership activity, on a route-by-route basis, is presented in **Exhibit 3-1**. Boardings, alightings, and total activity (boardings + alightings) are displayed for 2010 and 2008. For 2010, each route is ranked based on the total number of boardings. In order to compare ridership between 2008 and 2010, the percentage change in total activity is presented along with a corresponding growth rank. Based on recently released farebox data from FY 10-11, data is also included comparing the farebox data to the boarding data collected from the ride checkers in September 2010. This comparison provides insight into the validity of the 100 percent count sampled as an average weekday as compared to the actual full fiscal year farebox data. Overall, the farebox generated ridership is within 5 percent of the counts taken by ride checkers.

Routes highlighted in blue represent the top five CAT routes with the highest number of boardings while those in red represent the five routes with the lowest number of boardings. Routes shaded in green experienced the largest growth in ridership between 2008 and 2010. Those routes shaded in grey represent off-hour CAT routes, which run primarily during the early-morning and late-evening hours. While a boarding rank and growth rank is provided for reference purposes, their limited hours of service make comparisons to the more traditional fixed-routes with longer hours of service difficult. Therefore, the focus of comparisons was made among the major routes.

Exhibit 3-1
CAT Weekday Boarding and Alighting Activity

CAT BOARDINGS AND ALIGHTINGS BY ROUTE: 2010 vs. 2008											
	2010				2008					FY '11	
Route	Ons	Offs	Total	Board Rank	Ons	Offs	Total	% change	Growth Rank	Farebox Count	% of BA
1 Capital	1,994	2,015	4,009	2	1,508	1,521	3,029	32%	9	1,989	100%
2 Falls of Neuse	1,078	1,070	2,148	5	945	943	1,743	23%	17	944	88%
3 Glascock	306	304	610	22	307	301	608	0%	31	295	96%
4 Rex Hospital	1,087	1,094	2,181	4	1,064	1,062	1,936	13%	24	1,051	97%
5 Biltmore Hills	639	629	1,268	10	536	524	1,060	20%	18	648	101%
6 Crabtree	755	743	1,498	8	714	702	1,416	6%	29	753	100%
7 South Saunders	1,211	1,204	2,415	3	937	937	1,874	29%	12	1,213	100%
7c Carolina Pines	388	388	776	18	264	264	528	47%	5	439	113%
8 Northclift	521	522	1,043	13	485	491	976	7%	28	484	93%
8c Sawmill	180	180	360	25	166	166	332	8%	26	201	112%
10 Longview	468	447	915	16	331	319	650	41%	7	414	89%
11 Avent Ferry	1,061	1,070	2,131	6	733	744	1,477	44%	6	915	86%
11c Buck Jones	304	304	608	23	236	236	472	29%	13	280	92%
12 Method	939	937	1,876	7	859	851	1,710	10%	25	853	91%
13 Chavis Heights	327	333	660	21	238	239	477	37%	8	297	91%
15 WakeMed	2,208	2,222	4,430	1	1,919	1,931	3,850	15%	22	2,051	93%
15c Trawick	709	710	1,419	9	547	553	1,100	29%	11	747	105%
16 Oberlin Road	610	612	1,222	11	528	533	1,061	15%	21	514	84%
18 Worthdale	607	607	1,214	12	484	484	968	25%	15	551	91%
19 Apollo Heights	507	507	1,014	14	288	288	576	76%	1	410	81%
21 Caraleigh	475	469	944	15	522	521	1,043	9.0%	32	419	88%
22 State Street	434	427	861	17	372	373	745	16%	20	419	97%
23c Millbrook	304	304	608	23	267	267	534	14%	23	297	98%
24c North Crosstown	364	364	728	20	229	227	456	60%	3	342	94%
25c Triangle Town Ctr	371	371	742	19	245	247	492	51%	4	347	94%
70E Brier Creek	51	51	102	32	39	39	78	31%	10	62	122%
26c Early East	8	7	15	38	12	6	18	-17%	33	9	118%
27 Southeast	25	25	50	36	20	20	40	25%	16	24	95%
28 Southwest	14	14	28	37	13	13	26	8%	27	19	137%
29c North Night	45	45	90	34	35	35	70	29%	14	44	99%
30 Northeast	46	46	92	33	55	56	111	17%	34	56	122%
32 Sanderford Road	151	145	296	26	82	88	170	74%	2	126	83%
33c Glenwood	30	30	60	35	37	37	74	-19%	35	35	116%
35 Poole Road	96	97	193	28	90	93	183	6%	30	103	108%
36 Garner Station	130	137	267	27	115	111	226	18%	19	159	122%
37 North Hills	54	63	117	31	-	-	-			79	146%
38 Blue Ridge	87	91	178	29	-	-	-			102	118%
39 Cameron Village	73	73	146	30	-	-	-			79	108%
TOTAL	**18,657**	**18,657**	**37,314**		**15,222**	**15,222**	**30,109**	**24%**		**17,772**	**95%**

Source: 2010 CAT Boarding and Alighting Count

Total average weekday boardings for the CAT system are 18,657. As compared to 2008, this represents an overall increase in ridership of 3,435 boardings or 24% growth overall for the system. For the FY '10-11 farebox data, total weekday boardings averaged 17,772, which is within the 95% confidence interval of the average weekday estimate from the data collected by the ride checkers. This indicates that the ridership levels from the boarding and alighting count are representative of the typical weekday.

The top five routes in terms of daily riders are:

1. Route 15: Wake Med (2,208 boardings)
2. Route 1: Capital (1,994 boardings)
3. Route 7: South Saunders (1,211 boardings)
4. Route 4: Rex Hospital (1,087 boardings)
5. Route 2: Falls of Neuse (1,078 boardings)

As would be expected, the CAT routes with the highest ridership tended to travel along major corridors and serve major destinations. Major corridors identified included New Bern Ave., Capital Blvd., South Saunders St., Hillsborough St., and Falls of Neuse Rd. Several major destinations also existed along the routes with the highest ridership, including Wake Med Hospital, Triangle Town Center, Rex Hospital, and NC State University.

The bottom five routes in terms of daily riders are:

1. Route 70E: Brier Creek (51 boardings)
2. Route 8C: Sawmill (180 boardings)
3. Route 11C: Buck Jones (304 boardings)
4. Route 23C: Millbrook (304 boardings)
5. Route 3: Glascock (306 boardings)

Routes characterized by low ridership shared several characteristics. In terms of route structure, many are loops serving lower density suburban neighborhoods. These loops increase the travel time of the route, which can negatively impact passengers' perceptions of transit service convenience. Other than Route 3 Glascock, the low ridership routes did not serve Downtown Raleigh, the area's largest activity center. Finally, routes 8C, 11C, and 70E only offer service every hour. Routes 3 and 33C provide 30 minute frequency on a limited number of peak-hour trips, and hourly service the rest of the day. By increasing service headways, passengers' perception of transit availability is diminished, which functions to reduce the appeal of using transit.

The top routes in terms of growth since 2008 are:

1. Route 19: Apollo Heights (76% increase in boardings)
2. Route 24C: North Crosstown (60% increase in boardings)
3. Route 25C: Triangle Town Center (51% increase in boardings)
4. Route 7C: Carolina Pines (47% increase in boardings)
5. Route 11: Avent Ferry (44% increase in boardings)

The routes experiencing the largest growth in ridership provide service to major destinations as well as connections to other CAT routes. Major destinations include Triangle Town Center, Mini City, Duke Raleigh Hospital, and NC State University. The connector routes in particular, including the 7C, 24C, and 25C, provide the ability to transfer to routes that have extended service hours with the opportunity to reach Downtown Raleigh. Based on results from the 2010 CAT weekday rider survey, just over 50% of riders on the 7C, 24C, and 25C stated that they would transfer after alighting from the connector route.

3.1.1.2 CAT Saturday Ridership

CAT Saturday boarding and alighting activity, on a route-by-route basis, is illustrated in **Exhibit 3-2**. CAT Saturday boardings, alightings, and total activity is presented for 2010. Each route is ranked based on the number of Saturday boardings. Routes highlighted in blue represent the top five CAT routes with the highest number of Saturday boardings while those in red represent routes with the lowest number of Saturday boardings (excluding off-hour routes). Routes shaded in grey represent off-hour CAT routes, which run primarily during the early-morning and late-evening hours. No comparison to 2008 is given because the 2008 count did not include Saturdays.

As a general rule of thumb, Saturday boardings range between 50% and 67% of total weekday boardings. Routes highlighted in orange are outside of this range. A higher percentage of Saturday boardings, above 67%, could reflect a larger share of transit dependent riders riding the bus 6 to 7 days per week. This also demonstrates a lack of choice riders using the route for weekday commuting purposes. This indicates an opportunity to increase efforts towards capturing this potential ridership market. In contrast, a Saturday boarding percentage below 50% likely reflects a higher share of choice riders riding the bus 4 to 5 days per week.

Exhibit 3-2
CAT Saturday Boarding and Alighting Activity

CAT SATURDAY BOARDINGS AND ALIGHTINGS BY ROUTE 2010							
Route	Ons	Offs	Total	Board Rank	Wkdy Brd	Sat % of wkdy	Sat % Rank
1 Capital	1,246	1,252	2,498	1	1,994	62%	23
2 Falls of Neuse	473	472	945	10	1,078	44%	34
3 Glascock	178	176	354	22	306	58%	26
4 Rex Hospital	728	728	1,456	5	1,087	67%	17
5 Biltmore Hills	373	371	744	11	639	58%	25
6 Crabtree	532	533	1,065	7	755	70%	16
7 South Saunders	900	900	1,800	3	1,211	74%	14
7c Carolina Pines	255	255	510	17	388	66%	18
8 Northclift	284	282	566	15	521	55%	30
8c Sawmill	143	143	286	26	180	79%	12
10 Longview	254	253	507	18	468	54%	31
11 Avent Ferry	748	749	1,497	4	1,061	70%	15
11c Buck Jones	344	344	688	12	304	113%	7
12 Method	610	612	1,222	6	939	65%	20
13 Chavis Heights	168	172	340	24	327	51%	32
15 WakeMed	924	925	1,849	2	2,208	42%	35
15c Trawick	530	530	1,060	8	709	75%	13
16 Oberlin Road	338	341	679	13	610	55%	29

CAT SATURDAY BOARDINGS AND ALIGHTINGS BY ROUTE 2010							
Route	Ons	Offs	Total	Board Rank	Wkdy Brd	Sat % of wkdy	Sat % Rank
21 Caraleigh	300	298	598	14	475	63%	22
22 State Street	284	280	564	15	434	65%	19
23c Millbrook	171	171	342	23	304	56%	28
24c North Crosstown	209	209	418	21	364	57%	27
25c Triangle Town Ctr	224	224	448	19	371	60%	24
70E Brier Creek	49	49	98	31	51	96%	10
27 Southeast	12	12	24	34	25	48%	33
28 Southwest	9	9	18	35	14	64%	21
29c North Night	39	39	78	33	45	87%	11
30 Northeast	52	52	104	30	46	113%	8
32 Sanderford Road	150	157	307	25	151	99%	9
33c Glenwood	41	41	82	32	30	137%	6
35 Poole Road	507	506	1,013	9	96	528%	1
36 Garner Station	216	216	432	20	130	166%	4
37 North Hills	90	89	179	29	54	167%	3
38 Blue Ridge	137	135	272	28	87	157%	5
39 Cameron Village	141	134	275	27	73	193%	2
TOTAL	**11,659**	**11,659**	**23,318**		**17,535**	**66%**	

Source: 2010 CAT Boarding and Alighting Count

Total average Saturday boardings for CAT are 11,659. Saturday boardings represent 66% of overall weekday boardings, suggesting a relatively high share of transit dependent riders using the system.

The top five Saturday routes in terms of ridership are:

1. Route 1: Capital (1,246 boardings)
2. Route 15: Wake Med (924 boardings)
3. Route 7: South Saunders (900 boardings)
4. Route 11: Avent Ferry (748 boardings)
5. Route 4: Rex Hospital (728 boardings)

The bottom five Saturday routes in terms of ridership are:

1. Route 70: Brier Creek (49 boardings)
2. Route 8C: Sawmill (143 boardings)
3. Route 13: Chavis Heights (168 boardings)
4. Route 23C: Millbrook (171 boardings)
5. Route 3: Glascock (178 boardings)

Overall, CAT Saturday boardings relative to the top five and bottom five routes in terms of ridership were similar to the average weekday results. For the top five Saturday routes, Route 11 was the only route not in the top five for average weekday boardings. Relative to the bottom five, Route 13 was the only route not in the bottom five for boardings on an average weekday. With Route 13 operating primarily in Downtown Raleigh, the lack of workers downtown on a Saturday and lack of classes at Shaw University compared to an average weekday likely played a role in the reduction of overall boardings.

3.1.2 CTran

CTran average weekday and Saturday ridership for all routes is presented in **Exhibit 3-3**. Blue shading indicates the route with the highest total boardings while red indicates the route with the lowest total boardings. Orange shading indicates routes that are outside of the 50% to 67% range of Saturday boardings as a percentage of weekday boardings.

Total average weekday ridership for CTran is 630 passengers. Route 6 Buck Jones has the highest number of average weekday boardings. The route serves major destinations, including Downtown Cary and Cary Towne Center, and provides connections to TTA and CAT service to Downtown Raleigh. Route 3 Harrison has the lowest number of average weekday boardings. With Route 3 serving major employment centers including Weston, Downtown Cary, and Crescent Commons, opportunities should be explored to grow ridership particularly among choice riders who work along the corridor.

Total Saturday ridership for CTran is 506 passengers. Ridership figures are similar to weekday boardings, with Route 6 demonstrating the highest number of boardings while Route 3 has the lowest number of boardings. A majority of routes possess Saturday boardings that approach average weekday levels, with Saturday boardings representing 80% of average weekday boardings systemwide. This suggests a very large proportion of transit dependent riders using the system, likely riding 6 days per week.

Exhibit 3-3
CTran Weekday and Saturday Boarding and Alighting Activity

2010 CTRAN BOARDINGS AND ALIGHTINGS BY ROUTE AVERAGE WEEKDAY						
Route	Ons	Offs	2010 Total	Board Rank	FY '11 Farebox Count	% of BA
Route 1 Maynard	79	79	158	4	75	95%
Route 2 Maynard	68	68	136	5	63	93%
Route 3 Harrison	45	41	86	6	65	145%
Route 4 High House	114	118	232	3	126	111%
Route 5 Kildaire Farm	146	150	296	2	133	91%
Route 6 Buck Jones	178	174	352	1	126	71%
TOTAL	**630**	**630**	**1,260**		**589**	**94%**

AVERAGE SATURDAY							
Route	Ons	Offs	Total	Board Rank	Weekday boardings	Sat % of wkdy	Sat % Rank
Route 1 Maynard	59	59	118	5	79	75%	4
Route 2 Maynard	67	67	134	4	68	99%	2
Route 3 Harrison	52	52	104	6	45	116%	1
Route 4 High House	68	68	136	3	114	60%	6
Route 5 Kildaire Farm	95	95	190	2	146	65%	5
Route 6 Buck Jones	165	165	330	1	178	93%	3
TOTAL	**506**	**506**	**1,012**		**630**	**80%**	

Source: 2010 CTran Boarding and Alighting Count

3.2 Location Activity

From the stop level ridership information, the major activity locations for both CAT and CTran can be identified. This information provides a broad-scale overview into the unique travel patterns of passengers using CAT and CTran. In addition, these locations may present opportunities to enhance passenger comfort and convenience. For example, heavily used bus stops could be upgraded with additional amenities such as real-time bus arrival and departure information, shelters, benches, etc.

3.2.1 CAT

The major activity locations for CAT were identified based on stop-level average weekday ridership. Major ridership locations, based on total ridership activity (cumulative trip ends), is presented in **Exhibit 3-4**. These are not necessarily the 25 *most* active locations, but are a list of the major locations and others that are of interest, such as Brier Creek and Forum. In some cases, such as Pecan & Wilmington and Avent Ferry & Gorman, the activity is almost entirely due to transferring, and not because of any destination in the area.

Exhibit 3-4
CAT Major Activity Locations

Major Location	Ons	Offs	Total	Percent of system	Rank
Moore Square	5,902	4,704	10,606	28%	1
Wake Med	1,242	1,132	2,374	6%	2
CBD (outside of Moore Square)	450	1,558	2,008	5%	3
Triangle Town Center	613	711	1,324	4%	4
Crabtree Valley Mall	597	646	1,243	3%	5
NCSU	501	522	1,023	3%	6
Pecan & Wilmington	450	359	809	2%	7
Falls of Neuse	378	386	764	2%	8
Mini City	339	335	674	2%	9
Garner Area	325	268	593	2%	10
Cameron Village	278	274	552	2%	11
Poole & New Bern	243	303	546	2%	12
Avent Ferry & Gorman	214	221	435	1%	13
Southgate S/C	212	194	406	1%	14
Pleasant Valley	192	144	336	1%	15
New Bern Walmart	153	176	329	1%	16
North Hills & Northclift	147	156	303	1%	17
North Hills	137	132	269	1%	18
Highwoods	128	139	267	1%	19
Rex	110	111	221	1%	20
CAT	85	85	170	1%	21
Glenwood South	79	86	165	0%	22
Wake Tech North	55	51	106	0%	23
Forum	24	27	51	0%	24
Brier Creek	18	27	45	0%	25

Source: 2010 CAT Boarding and Alighting Count

As expected, the top location for total ridership activity for CAT is Moore Square, the central location in which most of CAT routes meet in downtown Raleigh. A total of 5,902 boardings and 4,704 alightings occurred at Moore Square, which accounts for 28% of all trip ends in the CAT system. These trips do not account for both the R-Line (not counted in the boarding and alighting survey) and Triangle Transit routes serving Downtown Raleigh. For Downtown Raleigh as a whole, excluding Moore Square, there were 450 boardings and 1,558 alightings or roughly 5% of all trip ends. This imbalance between boardings and alightings at Moore Square and the rest of Downtown, in opposite directions, suggests passengers will get off their bus at their destination in Downtown, but will walk to Moore Square for their return trip.

Beyond Downtown Raleigh, four broad areas accounted for 16% of all trip ends on CAT. These areas include Wake Med, Triangle Town Center, Crabtree Valley Mall, and NC State. However, boarding and alighting activity represents data collected at stops within the general vicinity of these locations, which may include transfer activity. Therefore, the total ridership activity does not necessarily represent riders destined for these specific locations. Collectively, Downtown Raleigh (including Moore Square), Wake Med, Triangle Town Center, Crabtree Valley Mall, and NC State represent 50% of all trip ends. Overall, the 25 major locations above represent 70% of all trips ends for the CAT system.

Besides the major activity center analysis, the data allows the calculation of activity at individual stops. For the system as a whole, percentiles for total boardings by stop for CAT are as follows:

- 25th percentile: 1 boarding
- 50th percentile: 3 boardings
- 75th percentile: 9 boardings
- 95th percentile: 35 boardings

This data can be used to identify the potential impact of providing shelters or benches for any given ridership level. For example, if the decision is to provide a shelter at all stops with over 35 boardings, 5% of the 1426 recorded stops, or 71 stops, would get a shelter. The stop activity can also be arrayed in descending order in the count database. From this approach, if the decision is, for example, to provide a shelter to half of the boardings in the system, shelters would be installed at all stops with 75 or more boardings/day.

3.2.2 CTran

CTran major activity locations were identified using the stop-level boarding and alighting counts for average weekday ridership. Major ridership locations for CTran are outlined in **Exhibit 3-5**.

The major activity location for total ridership activity for CTran was the Cary Train Station. A total of 123 boardings and 119 alightings occurred at the Cary Train Station. This total ridership activity is expected since it serves as the focal point for the CTran system. For Downtown Cary as a whole, excluding the Cary Train Station, there were 23 boardings and 13 alightings or 3% of all trip ends. Taken together, nearly a quarter of all trip ends for CTran were located in Downtown Cary.

Exhibit 3-5
CTran Major Activity Locations

Major Location	Ons	Offs	Total	% of system	Rank
Cary Train Station	123	119	242	19%	1
Cary Towne Center	49	60	109	9%	2
Crescent Green	51	49	100	8%	3
Nottingham	48	32	80	6%	4
Crossroads	30	34	64	5%	5
Kroger Maynard Crossing	23	26	49	4%	6
Buck Jones Corridor	21	23	44	3%	7
Kmart Mayfair Plaza	18	25	43	3%	8
Downtown	23	13	36	3%	9
Plaza West	22	14	36	3%	9
Kildaire Plaza	22	13	35	3%	11
Highland Village	24	10	34	3%	12
SAS/Weston	13	10	23	2%	13
Harrison Pointe S/C	11	11	22	2%	14
NC 55	7	13	20	2%	15
Preston Corners	3	12	15	1%	16
Bond Park	7	5	12	1%	17
Cornerstone	8	3	11	1%	18
Western Wake Med	3	5	8	1%	19

Source: 2010 CTran Boarding and Alighting Count

The major activity location for total ridership activity for CTran was the Cary Train Station. A total of 123 boardings and 119 alightings occurred at the Cary Train Station. This total ridership activity is expected since it serves as the focal point for the CTran system. For Downtown Cary as a whole, excluding the Cary Train Station, there were 23 boardings and 13 alightings or 3% of all trip ends. Taken together, nearly a quarter of all trip ends for CTran were located in Downtown Cary.

Outside of Downtown Cary, several other areas show significant ridership activity. These include Cary Towne Center, Crescent Green, Nottingham, and Cary Crossroads. A total of 178 boardings and 175 alightings were identified at these four locations. The vicinity surrounding each of these four major activity locations combines for 353 total trip ends. As a whole, Downtown Cary (including Cary Train Station), Cary Towne Center, Crescent Green, Nottingham, and Cary Crossroads represent 50% of all trip ends. Overall, the 19 major locations shown in **Exhibit 3-5** represent 80% of all trips ends for the CTran system.

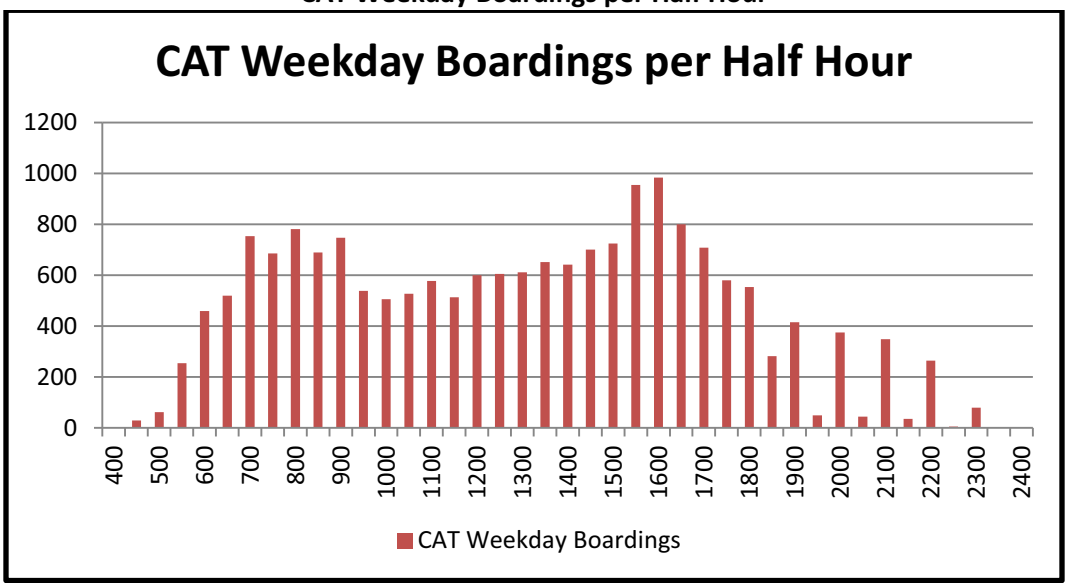
3.3 Ridership By Time of Day

Examining the time of day in which boardings occur provides insight into boarding trends over the course of a day. CAT and CTran weekday and Saturday ridership is divided into half hour increments based on the starting time of the outbound or inbound trip.

As illustrated in **Exhibit 3-6**, systemwide average weekday CAT boardings by trip is approximately bimodal with clear morning and afternoon peak periods. The overall peak hour was from 3:30pm – 4:30pm with 10% of the daily boardings. **Exhibit 3-7** presents systemwide Saturday CAT boardings by

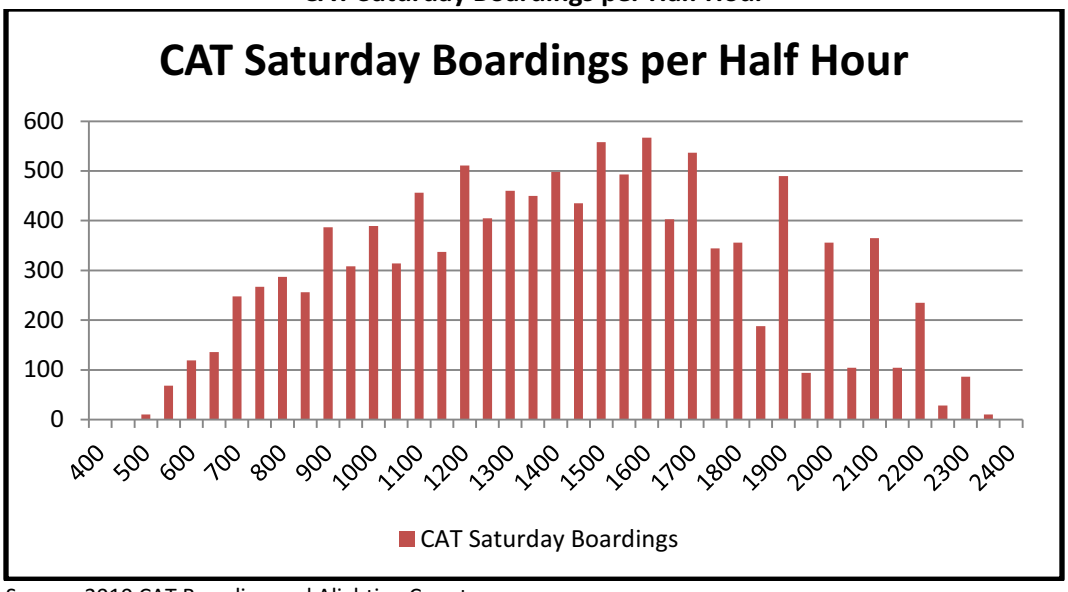
trip. Whereas CAT average weekday boardings were approximately bimodal, the distribution of Saturday boardings is approximately unimodal. With a greater share of discretionary, as opposed to work commute trip purposes, boardings build during the day with most boardings occurring in the mid afternoon between 2:30pm and 4:30pm, when each hourly period accounted for 9% of daily boardings. The choppy boardings at the end of the service day reflect the pulse leaving downtown on an hourly basis.

Exhibit 3-6
CAT Weekday Boardings per Half Hour



Source: 2010 CAT Boarding and Alighting Count

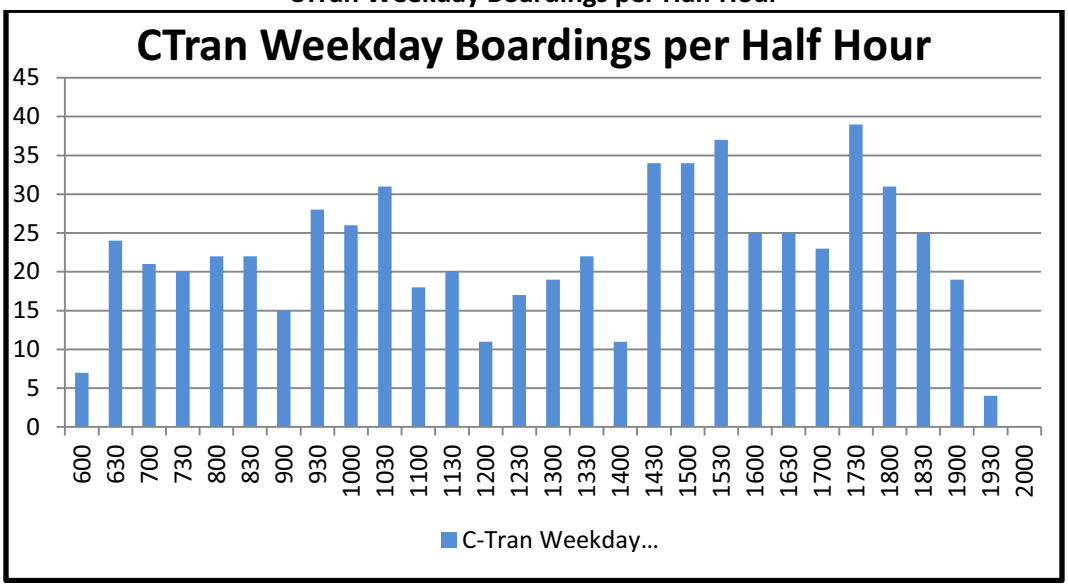
Exhibit 3-7
CAT Saturday Boardings per Half Hour



Source: 2010 CAT Boarding and Alighting Count

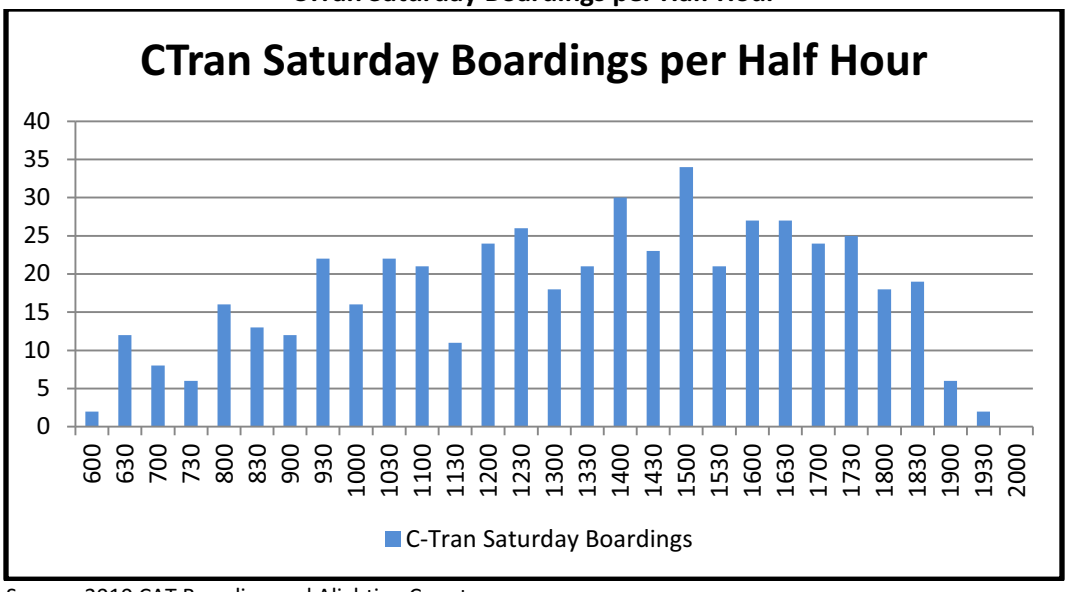
Exhibit 3-8 shows systemwide average weekday CTran boardings by half hour. Three unique peaks in ridership exist: mid-morning (9:30am-11:00am), mid-afternoon (2:30pm-4:00pm), and early-evening (5:30pm-7:00pm). The overall peak hour was from 3:00pm-4:00pm with 11% of the daily boardings. **Exhibit 3-9** presents Saturday CTran boardings by half hour. Similar to CAT Saturday, the distribution is approximately unimodal. Peak boardings occurred in the mid afternoon between 2:30pm and 3:30pm, with 12% of daily boardings.

Exhibit 3-8
CTran Weekday Boardings per Half Hour



Source: 2010 CAT Boarding and Alighting Count

Exhibit 3-9
CTran Saturday Boardings per Half Hour



Source: 2010 CAT Boarding and Alighting Count

3.4 Passenger Maximum Load Analysis

Passenger loads reflect the number of individuals on-board a bus at any given point during a trip. Significant overcrowding on a bus negatively affects passengers' overall assessment of the comfort of the trip. Overloaded trips may also signal the need to increase service frequencies or vehicle sizes in order to reduce overcrowding on certain trips. While standees may be permitted during peak-hours, an excessive number should be avoided and generally every passenger should have a seat during off-peak hours.

Suggested Passenger Load LOS Standard
For systems the size of CAT and CTran, a desirable target is LOS "C" for both peak and off-peak times. Systems in larger cities may adopt LOS "D" during peak trips, but Raleigh and Cary can have a more relaxed standard that calls for no standees.

The Transit Cooperative Research Program (TCRP) *Report 100: Transit Capacity and Quality of Service Manual* (2nd Edition) provides guidance on assessing passenger loads aboard transit vehicles. Based on a calculated load factor (passengers per seat), passenger Level-of-Service (LOS) standards can assess passenger loads aboard transit vehicles. **Exhibit 3-10** provides an overview of LOS standards as applied to maximum loads aboard transit vehicles.

Exhibit 3-10
Passenger Load LOS

LOS	Passenger load factor (p/seat)	Comments
A	0.00 – 0.50	No passengers need to sit next to each other
B	0.51 – 0.75	Some passengers will need to sit next to others
C	0.76 – 1.00	All passengers can sit though choices will be limited
D	1.01 – 1.25	Some passengers required to stand
E	1.26 – 1.50	Maximum load of passengers achieved (seated & standees)
F	> 1.50	Crush load

Source: *TCRP Report 100: Transit Capacity and Quality of Service Manual* (2nd Edition)

3.4.1 CAT

3.4.1.1 CAT Weekday Maximum Passenger Loads

For the weekday CAT system as a whole, maximum passenger load LOS is presented in **Exhibit 3-11**. Based on CAT's existing bus fleet, a weighted average was calculated of 42 seats per bus. Most weekday CAT route trips operate below 50% capacity on a given trip. While roughly 5% approach the need for standees on the bus, less than 1% of trips actually require standees.

Exhibit 3-11
CAT Weekday Maximum Passenger Loads Systemwide

LOS	Passenger load factor (p/seat)	Max pax threshold	Total trips	% of trips
A	0.00 – 0.50	21	949	81%
B	0.51 – 0.75	31	157	13%
C	0.76 – 1.00	42	53	5%
D	1.01 – 1.25	52	7	1%
E	1.26 – 1.50	63	3	0%
F	> 1.50		0	0%

Source: 2010 CAT Boarding and Alighting Count

In order to identify routes and specific bus trips experiencing poor passenger load LOS standards, **Exhibit 3-12** presents the findings by route direction. Routes in grey shading represent off-hour weekday CAT routes. Depending on factors such as the route, direction of travel, and the time of day, increased frequency and/or bus capacity may be warranted for certain routes.

Exhibit 3-12
CAT Weekday Maximum Passenger Loads By Route Direction

CAT Weekday Maximum Passenger Loads By Direction TCRP Categories: Pax load LOS							
Route Number	Route Description	A	B	C	D	E	F
10	Capital OB	23%	48%	29%	-	-	-
11	Capital IB	39%	35%	23%	3%	-	-
20	Falls of Neuse OB	59%	36%	-	5%	-	-
21	Falls of Neuse IB	50%	36%	14%	-	-	-
30	Glascock OB AM	100%	-	-	-	-	-
31	Glascock IB AM	87%	13%	-	-	-	-
32	Glascock OB PM	100%	-	-	-	-	-
33	Glascock IB PM	100%	-	-	-	-	-
40	Rex Hospital OB	71%	25%	4%	-	-	-
41	Rex Hospital IB	88%	8.0%	4%	-	-	-
50	Biltmore Hills OB	76%	19%	5%	-	-	-
51	Biltmore Hills IB	86%	14%	-	-	-	-
60	Crabtree OB	85%	15%	-	-	-	-
61	Crabtree IB	90%	10%	-	-	-	-
70	South Saunders OB	60%	32%	4%	-	4%	-
71	South Saunders IB	54%	31%	15%	-	-	-
72	Carolina Pines EB	100%	-	-	-	-	-
73	Carolina Pines WB	100%	-	-	-	-	-
80	Northclift OB	95%	5%	-	-	-	-
81	Northclift IB	100%	-	-	-	-	-
82	Sawmill EB	100%	-	-	-	-	-
83	Sawmill WB	100%	-	-	-	-	-
100	Longview OB	95%	5%	-	-	-	-
101	Longview IB	85%	15%	-	-	-	-
110	Avent Ferry OB AM	100%	-	-	-	-	-
111	Avent Ferry IB AM	50%	40%	-	10%	-	-
112	Avent Ferry OB PM	29%	57%	14%	-	-	-
113	Avent Ferry IB PM	93%	7%	-	-	-	-
114	Buck Jones OB	100%	-	-	-	-	-
115	Buck Jones IB	100%	-	-	-	-	-
120	Method OB	75%	21%	4%	-	-	-
121	Method IB	71%	21%	8%	-	-	-
130	Chavis Heights Loop	100%	-	-	-	-	-
150	WakeMed OB	48%	28%	18%	2%	4%	-
151	WakeMed IB	63%	11%	20%	6%	-	-

CAT Weekday Maximum Passenger Loads By Direction TCRP Categories: Pax load LOS							
Route Number	Route Description	A	B	C	D	E	F
152	Trawick Connect OB	84%	12%	4%	-	-	-
153	Trawick Connect IB	92%	8%	-	-	-	-
160	Oberlin OB	79%	21%	-	-	-	-
161	Oberlin IB	84%	5%	11%	-	-	-
180	Worthdale OB	91%	9%	-	-	-	-
181	Worthdale IB	95%	5%	-	-	-	-
190	Apollo Heights OB	100%	-	-	-	-	-
191	Apollo Heights IB	90%	10%	-	-	-	-
210	Caraleigh Loop	76%	24%	-	-	-	-
220	State Street OB	96%	4%	-	-	-	-
221	State Street IB	93%	7%	-	-	-	-
232	Millbrook EB	100%	-	-	-	-	-
233	Millbrook WB	100%	-	-	-	-	-
242	North EB	100%	-	-	-	-	-
243	North WB	94%	6%	-	-	-	-
252	Triangle Town Ctr	69%	31%	-	-	-	-
700	Brier Creek Ex OB	100%	-	-	-	-	-
701	Brier Creek Ex IB	100%	-	-	-	-	-
262	Early East OB	100%	-	-	-	-	-
263	Early East IB	100%	-	-	-	-	-
270	Southeast OB	100%	-	-	-	-	-
271	Southeast IB	100%	-	-	-	-	-
280	Southwest OB	100%	-	-	-	-	-
281	Southwest IB	100%	-	-	-	-	-
292	North Night OB	100%	-	-	-	-	-
293	North Night Conn IB	100%	-	-	-	-	-
300	Northeast OB	100%	-	-	-	-	-
301	Northeast IB	100%	-	-	-	-	-
320	Sanderford Road OB	25%	50%	25%	-	-	-
321	Sanderford Road IB	100%	-	-	-	-	-
332	Glenwood OB	100%	-	-	-	-	-
333	Glenwood IB	100%	-	-	-	-	-
350	Poole Road OB	100%	-	-	-	-	-
351	Poole Road IB	100%	-	-	-	-	-
360	Garner Station OB	50%	50%	-	-	-	-
361	Garner Station IB	100%	-	-	-	-	-
370	North Hills OB	100%	-	-	-	-	-
371	North Hills IB	100%	-	-	-	-	-
380	Blue Ridge OB	100%	-	-	-	-	-
381	Blue Ridge IB	100%	-	-	-	-	-
390	Cameron Village OB	100%	-	-	-	-	-
391	Cameron Village IB	100%	-	-	-	-	-

Source: 2010 CAT Boarding and Alighting Count

CAT weekday routes were examined to identify specific trips where the number of passengers on-board at any point exceeded 42 passengers. Routes where passenger loads exceeded 42 passengers include: Route 15 Wake Med (6 trips); Route 1 Capital (1 trip); Route 2 Falls of Neuse (1 trip); Route 7 South Saunders (1 trip); and Route 11 Avent Ferry (1 trip).

CAT weekday routes were further examined to identify areas where a series of trips operated at LOS C or worse. As expected, maximum passenger loads at LOS C or worse took place during the morning, mid-day, and evening peak ridership periods. This occurred on two routes, Route 1 Capital and Route 15 Wake Med, which is outlined in **Exhibit 3-13**.

Exhibit 3-13
CAT Weekday Maximum Passenger Loads for Select Trips

Trip Start Time	Ons	Offs	Max Load	LOS
1 Capital OB				
Morning Peak Period (6:00 AM – 9:30 AM)				
715	45	39	36	C
745	52	42	35	C
815	31	24	22	B
845	52	50	35	C
Mid-Day Peak Period (12:00 PM – 3:00 PM)				
1315	46	41	34	C
1345	42	31	28	B
1415	30	22	17	A
1445	73	50	39	C
Evening Peak Period (3:00 PM – 7:00PM)				
1515	43	34	29	B
1545	50	40	42	C
1615	63	53	37	C
1645	76	48	39	C
1 Capital IB				
Morning Peak Period (6:00 AM – 9:30 AM)				
720	44	54	44	D
750	22	27	24	B
820	42	55	40	C
Evening Peak Period (3:00 PM – 7:00PM)				
1520	21	46	33	C
1550	37	42	35	C
1620	41	51	36	C
1650	39	49	36	C
1720	22	51	36	C
15 Wake Med OB				
Off-Peak Period (9:30 AM – 12:00PM)				
945	52	38	37	C
1015	57	32	34	C
1045	42	31	28	B
1115	58	27	35	C
1145	52	39	35	C

Trip Start Time	Ons	Offs	Max Load	LOS
Mid-Day Peak Period (12:00 PM – 3:00 PM)				
1215	91	49	57	E
1245	46	44	34	C
1315	61	42	37	C
1345	43	33	35	C
1415	66	29	39	C
1445	71	58	57	E
Evening Peak Period (3:00 PM – 7:00 PM)				
1500	31	19	19	A
1515	43	14	29	B
1530	68	51	49	D
15 Wake Med IB				
Off-Peak Period (9:30 AM – 12:00PM)				
945	10	30	27	B
1015	18	33	28	B
1045	35	58	47	D
1115	32	43	37	C
1145	22	52	41	C
Mid-Day Peak Period (12:00 PM – 3:00 PM)				
1215	22	37	32	C
1245	21	61	52	D
1315	27	34	32	C
1345	21	40	28	B
1415	23	37	28	B
1445	15	51	39	C
Evening Peak Period (3:00 PM – 7:00 PM)				
1515	38	54	46	D
1530	29	41	40	C
1545	12	36	39	C
1600	20	37	35	C

Source: 2010 CAT Boarding and Alighting Count

3.4.1.2 CAT Saturday Maximum Passenger Loads

CAT Saturday maximum passenger load LOS is outlined in **Exhibit 3-14**. Most Saturday CAT trips operate below 50% capacity on a given trip. Compared to CAT average weekday routes, a higher proportion of CAT Saturday routes operate trips at LOS D where passengers may be required to stand.

Exhibit 3-14
CAT Saturday Maximum Passenger Loads Systemwide

LOS	Passenger load factor (p/seat)	Max pax threshold	Total trips	% of trips
A	0.00 – 0.50	21	647	82%
B	0.51 – 0.75	31	102	13%
C	0.76 – 1.00	42	26	3%
D	1.01 – 1.25	52	13	2%
E	1.26 – 1.50	63	2	0%
F	> 1.50		0	0%

Source: 2010 CAT Boarding and Alighting Count

Exhibit 3-15 presents the findings by route direction. Routes in grey shading represent off-hour Saturday CAT routes. Factors such as the specific route, direction of travel, and the time of day, increased frequency and/or bus capacity may be warranted for certain routes.

Exhibit 3-15
CAT Saturday Maximum Passenger Loads By Route Direction

CAT Saturday Maximum Passenger Loads By Direction TCRP Categories: Pax load LOS							
Route Number	Route Description	A	B	C	D	E	F
10	Capital OB	28%	33%	17%	16%	6%	-
11	Capital IB	33%	28%	6%	28%	5%	-
20	Falls of Neuse OB	93%	7%	-	-	-	-
21	Falls of Neuse IB	100.0%	-	-	-	-	-
30	Glascock OB AM	100%	-	-	-	-	-
31	Glascock IB AM	100%	-	-	-	-	-
32	Glascock OB PM	100%	-	-	-	-	-
33	Glascock IB PM	100%	-	-	-	-	-
40	Rex Hospital OB	64%	36%	-	-	-	-
41	Rex Hospital IB	53%	40%	-	7%	-	-
50	Biltmore Hills OB	100%	-	-	-	-	-
51	Biltmore Hills IB	76%	23%	-	-	-	-
60	Crabtree OB	58%	17%	25%	-	-	-
61	Crabtree IB	100%	-	-	-	-	-
70	South Saunders OB	45%	45%	10%	-	-	-
71	South Saunders IB	60%	35%	-	5%	-	-
72	Carolina Pines EB	100%	-	-	-	-	-
73	Carolina Pines WB	100%	-	-	-	-	-
80	Northclift OB	100%	-	-	-	-	-
81	Northclift IB	100%	-	-	-	-	-
82	Sawmill EB	100%	-	-	-	-	-
83	Sawmill WB	100%	-	-	-	-	-
100	Longview OB	92%	8%	-	-	-	-
101	Longview IB	100%	-	-	-	-	-
110	Avent Ferry OB AM	100%	-	-	-	-	-
111	Avent Ferry IB AM	50%	33%	17%	-	-	-
112	Avent Ferry OB PM	45%	36%	18%	-	-	-
113	Avent Ferry IB PM	64%	27%	-	9%	-	-
114	Buck Jones OB	93%	7%	-	-	-	-
115	Buck Jones IB	94%	6%	-	-	-	-
120	Method OB	73%	27%	-	-	-	-
121	Method IB	60%	33%	7%	-	-	-
130	Chavis Heights Loop	100%	-	-	-	-	-
150	WakeMed OB	37%	32%	26%	5%	-	-
151	WakeMed IB	42%	32%	21%	5%	-	-
152	Trawick Connect OB	89%	5%	5.6%	-	-	-

CAT Saturday Maximum Passenger Loads By Direction		TCRP Categories: Pax load LOS					
Route Number	Route Description	A	B	C	D	E	F
153	Trawick Connect IB	94%	6%	-	-	-	-
160	Oberlin OB	83%	17%	-	-	-	-
161	Oberlin IB	92%	8%	-	-	-	-
210	Caraleigh Loop	77%	23%	-	-	-	-
220	State Street OB	100%	-	-	-	-	-
221	State Street IB	100%	-	-	-	-	-
232	Millbrook EB	100%	-	-	-	-	-
233	Millbrook WB	100%	-	-	-	-	-
242	North EB	100%	-	-	-	-	-
243	North WB	100%	-	-	-	-	-
252	Triangle Town Ctr	100%	-	-	-	-	-
700	Brier Creek Ex OB	100%	-	-	-	-	-
701	Brier Creek Ex IB	100%	-	-	-	-	-
270	Southeast OB	100%	-	-	-	-	-
271	Southeast IB	100%	-	-	-	-	-
280	Southwest OB	100%	-	-	-	-	-
281	Southwest IB	100%	-	-	-	-	-
292	North Night OB	100%	-	-	-	-	-
293	North Night Conn IB	100%	-	-	-	-	-
300	Northeast OB	100%	-	-	-	-	-
301	Northeast IB	100%	-	-	-	-	-
320	Sanderford Road OB	50%	50%	-	-	-	-
321	Sanderford Road IB	100%	-	-	-	-	-
332	Glenwood OB	100%	-	-	-	-	-
333	Glenwood IB	100%	-	-	-	-	-
350	Poole Road OB	61%	39%	-	-	-	-
351	Poole Road IB	94%	6%	-	-	-	-
360	Garner Station OB	-	75%	25%	-	-	-
361	Garner Station IB	50%	50%	-	-	-	-
370	North Hills OB	100%	-	-	-	-	-
371	North Hills IB	100%	-	-	-	-	-
380	Blue Ridge OB	100%	-	-	-	-	-
381	Blue Ridge IB	80%	20%	-	-	-	-
390	Cameron Village OB	75%	25%	-	-	-	-
391	Cameron Village IB	33%	-	67%	-	-	-

Source: 2010 CAT Boarding and Alighting Count

CAT Saturday routes were examined to identify specific trips where the number of passengers on-board at any point exceeded 42 passengers. Routes where passenger loads exceeded 42 passengers include:

- Route 1 Capital (10 trips);
- Route 15 Wake Med (2 trips);
- Route 4 Rex Hospital (1 trip);

- Route 7 South Saunders (1 trip); and
- Route 11 Avent Ferry (1 trip).

Compared to CAT average weekday routes, Route 1 gained in the number of trips requiring standees while Route 15 reduced in the number of trips requiring standees. This finding likely reflects the increased demand for discretionary trip purposes on Saturdays. Route 1 Capital runs along a major commercial corridor, Capital Blvd., containing numerous shopping and entertainment destinations.

CAT Saturday routes were examined to identify areas where a series of trips operated at LOS C or worse. This occurred on two routes, Route 1 Capital and Route 15 Wake Med, which is outlined in **Exhibit 3-16**.

Exhibit 3-16
CAT Saturday Maximum Passenger Loads for Select Trips

Trip Start Time	Ons	Offs	Max Load	LOS
1 Capital OB				
1045	58	51	41	C
1145	46	33	31	B
1245	63	43	30	B
1345	86	58	57	E
1445	56	18	39	C
1545	86	56	48	D
1645	66	36	52	D
1745	40	31	25	B
1900	59	38	51	D
1 Capital IB				
1020	20	36	27	B
1120	23	30	25	B
1220	38	51	43	D
1320	27	47	39	C
1420	45	73	52	D
1520	25	63	52	D
1620	29	59	46	D
1720	53	84	63	E
1820	28	37	31	B
1930	25	50	47	D
15 Wake Med OB				
1130	69	25	44	D
1230	49	25	24	B
1330	66	35	34	C
1430	50	25	25	B
1530	74	38	36	C
1630	40	23	19	A
1730	40	36	34	C
1830	61	39	34	C
15 Wake Med IB				
1200	12	56	48	D
1300	18	42	38	C
1400	7	38	34	C

Trip Start Time	Ons	Offs	Max Load	LOS
1500	22	47	37	C
1600	6	42	37	C
1700	10	27	25	B

Source: 2010 CAT Boarding and Alighting Count

3.4.2 CTran

3.4.2.1 CTran Weekday Maximum Passenger Loads

Systemwide CTran average weekday maximum passenger load LOS is outlined in **Exhibit 3-17**. Based on CTran's existing bus fleet, a weighted average bus capacity was calculated to be 18 seats per bus.

Exhibit 3-17
CTran Weekday Maximum Passenger Loads Systemwide

LOS	Passenger load factor (p/seat)	Max pax threshold	Total trips	% of trips
A	0.00 – 0.50	9	186	99%
B	0.51 – 0.75	14	2	1%
C	0.76 – 1.00	18	0	0%
D	1.01 – 1.25	23	0	0%
E	1.26 – 1.50	28	0	0%
F	> 1.50		0	0%

Source: 2010 CTran Boarding and Alighting Count

As indicated in **Exhibit 3-17**, nearly all CTran weekday trips operate below 50% on a given trip. Due to potential variability in maximum passenger load by specific route, route direction, and time of day, additional detail is provided for each CTran route, by direction, summarized in **Exhibit 3-18**.

Exhibit 3-18
CTran Weekday Maximum Passenger Loads By Direction

		TCRP Categories: Pax load LOS					
Route Number	**Route Description**	**A**	**B**	**C**	**D**	**E**	**F**
10	Maynard Loop	100%	-	-	-	-	-
11	Crossroads Loop	100%	-	-	-	-	-
20	Maynard Loop	100%	-	-	-	-	-
21	Crossroads Loop	100%	-	-	-	-	-
30	Harrison Avenue OB	100%	-	-	-	-	-
30	Harrison Avenue IB	100%	-	-	-	-	-
40	High House Rd OB	100%	-	-	-	-	-
41	High House Rd IB	100%	-	-	-	-	-
50	Kildaire Farm OB	96%	4%	-	-	-	-
50	Kildaire Farm IB	91%	9%	-	-	-	-
60	Buck Jones OB	100%	-	-	-	-	-
61	Buck Jones IB	100%	-	-	-	-	-

Source: 2010 CTran Boarding and Alighting Count

CTran weekday routes were examined to identify specific trips operating at LOS C where the number of passengers on-board at any point exceeded 18 passengers. No CTran trips approached this load; with the lowest being LOS B on two trips on Route 5 Kildaire Farm.

3.4.2.2 CTran Saturday Maximum Passenger Loads

Overall systemwide CTran Saturday maximum passenger load LOS is presented in **Exhibit 3-19**. Similar to CTran weekday passenger load, nearly all CTran Saturday trips operate below 50% on a given trip. **Exhibit 3-20** provides the detail by route and direction.

Exhibit 3-19
CTran Saturday Maximum Passenger Loads Systemwide

LOS	Passenger load factor (p/seat)	Max pax threshold	Total trips	% of trips
A	0.00 – 0.50	9	186	99%
B	0.51 – 0.75	14	2	1%
C	0.76 – 1.00	18	0	0%
D	1.01 – 1.25	23	0	0%
E	1.26 – 1.50	28	0	0%
F	> 1.50		0	0%

Source: 2010 CTran Boarding and Alighting Count

Exhibit 3-20
CTran Saturday Maximum Passenger Loads By Direction

CTran Saturday Maximum Passenger Loads By Direction TCRP Categories: Pax load LOS							
Route Number	Route Description	A	B	C	D	E	F
10	Maynard Loop	100%	-	-	-	-	-
11	Crossroads Loop	100%	-	-	-	-	-
20	Maynard Loop	100%	-	-	-	-	-
21	Crossroads Loop	93%	7%	-	-	-	-
30	Harrison Avenue OB	100%	-	-	-	-	-
30	Harrison Avenue IB	100%	-	-	-	-	-
40	High House Rd OB	100%	-	-	-	-	-
41	High House Rd IB	100%	-	-	-	-	-
50	Kildaire Farm OB	100%	-	-	-	-	-
50	Kildaire Farm IB	100%	-	-	-	-	-
60	Buck Jones OB	95%	5%	-	-	-	-
61	Buck Jones IB	100%	-	-	-	-	-

Source: 2010 CTran Boarding and Alighting Count

3.5 Route On-Time Performance

A fundamental measure in the assessment of overall transit quality of service output is route on-time performance. On-time performance serves as a key reliability measure that significantly impacts the perception of the system's overall comfort and convenience. Transit passengers are very time sensitive, as they are generally motivated to reach their destination in the most time efficient manner as possible. The ease to which passengers are either able to reach their destination on-time or complete a timed transfer effectively is directly related to on-time performance of the routes in the system.

Suggested On-Time LOS Standard
For CAT and CTran, a reasonable target is LOS "C". Larger urban systems may adopt a lower standard of LOS "D" due to the greater variability in traffic conditions, but the relative consistent travel times in Raleigh and Cary allow for a more attractive LOS "C" standard. A higher LOS is also desirable given the relative infrequency of service – the consequences of missing a transfer can be severe (30 minutes or more), necessitating a higher standard.

The TCRP *Report 100: Transit Capacity and Quality of Service Manual* (2nd Edition) provides guidance on assessing on-time performance. Generally, transit trips are considered "on-time" if they depart at the scheduled timepoint 0 to 5 minutes late. Trips departing after 5 minutes are considered "late". Trips departing at a timepoint early, with the exception of the last timepoint at the end of the route, are considered "early". Trips are not penalized if they arrive early at a timepoint but leave on time. Based on an overall percentage of on-time trips for each route, on-time LOS standards can be applied to asses the on-time performance of routes. **Exhibit 3-21** provides an overview of LOS standards as applied to the on-time performance of routes:

Exhibit 3-21
On-time Performance LOS Standards

LOS	On-time percentage of trips	Individual perspective based on 5 round trips per week
A	95% - 100%	1 late transit vehicle every 2 weeks (no transfer)
B	90% - 94.9%	1 late transit vehicle every week (no transfer)
C	85% – 89.9%	3 late transit vehicles every 2 weeks (no transfer)
D	80% – 84.9%	2 late transit vehicles every week (no transfer)
E	75% – 79.9%	1 late transit vehicle every day (with a transfer)
F	< 74.9%	1 late transit vehicle at least daily (with a transfer)

Source: *TCRP Report 100: Transit Capacity and Quality of Service Manual* (2nd Edition)

3.5.1 CAT

3.5.1.1 CAT Weekday Route On-Time Performance

CAT weekday on-time performance for each route is presented in **Exhibit 3-22**. Routes in grey shading represent off-hour weekday CAT routes. Overall, CAT weekday on-time performance is poor, with the system achieving LOS E. A total of 480 trips were classified early, 534 were classified late, and 3,120 were classified as on-time. Based on an overall sample of 4,134 trips, 76% of all trips arrived on-time. As illustrated in **Exhibit 3-22**, among regular peak-hour CAT weekday service, no route achieved better than LOS C with a majority of routes receiving LOS E or F. And while the CAT off-hour services generally outperformed the regular CAT routes in on-time performance LOS, this is likely heavily influenced by the off-hour services limited total trip sample sizes as well as their truncated service hour spans.

Exhibit 3-22
CAT Weekday On-Time Performance By Route

Route	Total samples	Total early	Total late	Total on-time	Percent on-time	On-time LOS
1 Capital	217	2	30	185	85%	C
2 Falls of Neuse	220	43	41	136	62%	F
3 Glascock	114	6	16	92	81%	D
4 Rex Hospital	245	39	32	174	71%	F
5 Biltmore Hills	126	2	22	102	81%	D
6 Crabtree	200	53	19	128	64%	F
7 South Saunders	153	26	13	114	75%	F
7c Carolina Pines	153	31	7	115	76%	E
8 Northclift	168	35	11	122	73%	F
8c Sawmill	93	7	10	76	82%	D
10 Longview	120	13	22	85	71%	F
11 Avent Ferry	192	7	57	128	67%	F
11c Buck Jones	174	8	38	128	74%	F
12 Method	168	17	19	132	79%	E
13 Chavis Heights	78	12	7	59	76%	E
15 WakeMed	276	37	27	212	77%	E
15c Trawick	175	41	6	128	73%	F
16 Oberlin Road	152	14	20	118	78%	E
18 Worthdale	126	2	11	113	90%	C
19 Apollo Heights	160	20	5	135	84%	D
21 Caraleigh	63	2	5	56	89%	C
22 State Street	108	1	13	94	87%	C
23c Millbrook	144	22	6	116	81%	D
24c North Crosstown	111	1	44	66	59%	F
25c Triangle Town Ctr.	65	2	27	36	55%	F
70E Brier Creek	45	2	3	40	89%	C
26c Early East	7	2	0	5	71%	F
27 Southeast	12	1	1	10	83%	D
28 Southwest	12	3	0	9	75%	E
29c North Night	21	1	1	19	90%	B
30 Northeast	28	3	0	25	89%	C
32 Sanderford Road	32	3	1	28	88%	C
33c Glenwood	18	1	1	16	89%	C
35 Poole Road	25	2	2	21	84%	D
36 Garner Station	32	5	3	24	75%	E
37 North Hills	28	5	2	21	75%	E
38 Blue Ridge	45	7	8	30	67%	F
39 Cameron Village	28	2	4	22	79%	E
TOTAL	**4,134**	**480**	**534**	**3,120**	**76%**	E

Source: 2010 CAT Boarding and Alighting Count

3.5.1.2 CAT Saturday On-Time Performance

CAT Saturday on-time performance by route is presented in **Exhibit 3-23**. Compared with CAT weekday service, Saturday service preformed worse in on-time performance. Overall, CAT Saturday on-time performance is very poor, with a systemwide LOS F. A total of 399 trips were early, 454 were late, and 1,934 were as on-time. Based on an overall sample of 2,787 trips, 69% of all trips arrived on-time.

Exhibit 3-23
CAT Saturday On-Time Performance By Route

Route	Total samples	Total early	Total late	Total on-time	Percent on-time	On-time LOS
1 Capital	126	6	34	86	68%	F
2 Falls of Neuse	140	30	15	95	68%	F
3 Glascock	75	4	13	58	77%	E
4 Rex Hospital	144	61	1	82	57%	F
5 Biltmore Hills	78	0	13	65	83%	D
6 Crabtree	120	25	30	65	54%	F
7 South Saunders	120	27	3	90	76%	E
7c Carolina Pines	103	29	4	70	68%	F
8 Northclift	104	19	17	68	65%	F
8c Sawmill	78	11	12	55	71%	F
10 Longview	78	9	20	49	63%	F
11 Avent Ferry	166	8	56	102	61%	F
11c Buck Jones	158	21	16	121	77%	E
12 Method	105	14	8	83	79%	E
13 Chavis Heights	78	20	3	55	71%	F
15 WakeMed	114	9	13	92	81%	D
15c Trawick	126	27	6	93	74%	F
16 Oberlin Road	96	18	20	58	60%	F
21 Caraleigh	39	2	7	30	77%	E
22 State Street	100	0	6	94	94%	B
23c Millbrook	100	14	3	83	83%	D
24c North Crosstown	81	4	20	57	70%	F
25c Triangle Town Ctr.	84	7	34	43	51%	F
70E Brier Creek	45	7	1	37	82%	D
27 Southeast	6	1	0	5	83%	D
28 Southwest	6	2	0	4	67%	F
29c North Night	21	1	4	16	76%	E
30 Northeast	28	6	0	22	79%	E
32 Sanderford Road	32	4	11	17	53%	F
33c Glenwood	18	1	7	10	56%	F
35 Poole Road	90	1	55	34	38%	F
36 Garner Station	28	2	10	16	57%	F
37 North Hills	28	3	3	22	79%	E
38 Blue Ridge	45	2	4	39	87%	C
39 Cameron Village	27	4	5	18	67%	F
TOTAL	**2,787**	**399**	**454**	**1,934**	**69%**	**F**

Source: 2010 CAT Boarding and Alighting Count

3.5.2 CTran

CTran on-time performance for weekday and Saturday routes is detailed in **Exhibit 3-24**. Overall, both weekday and Saturday CTran on-time performance was poor, achieving an overall LOS E. For CTran weekday service, a total of 80 trips were early, 125 were late, and 630 were as on-time. Based on an overall sample of 835 trips, 75% of all trips arrived on-time. However, two weekday routes stood out and preformed remarkably well on on-time performance: Route 3 Harrison and Route 5 Kildaire Farm.

For Saturday CTran routes, a total of 67 trips were early, 129 were late, and 630 were as on-time. With an overall sample of 826 trips, 76% of all trips arrived on-time. Similar to weekday service, Route 3 Harrison preformed reasonably well on on-time performance as compared to other Saturday routes.

Exhibit 3-24
CTran On-Time Performance By Route

WEEKDAY						
Route	Total samples	Total early	Total late	Total on-time	Percent on-time	On-time LOS
Route 1 Maynard	112	16	13	73	65%	F
Route 2 Maynard	126	3	49	74	59%	F
Route 3 Harrison	115	2	1	112	97%	A
Route 4 High House	168	22	27	119	71%	F
Route 5 Kildaire Farm	138	6	0	132	96%	A
Route 6 Buck Jones	176	31	25	120	68%	F
TOTAL	**835**	**80**	**125**	**630**	**75%**	**E**

SATURDAY						
Route	Total samples	Total early	Total late	Total on-time	Percent on-time	On-time LOS
Route 1 Maynard	95	10	29	46	48	F
Route 2 Maynard	126	2	53	71	56	F
Route 3 Harrison	115	3	6	106	92	B
Route 4 High House	176	22	5	149	84%	D
Route 5 Kildaire Farm	138	9	11	118	86%	C
Route 6 Buck Jones	176	21	15	140	79%	E
TOTAL	**826**	**67**	**129**	**630**	**76%**	**E**

Source: 2010 CTran Boarding and Alighting Count

INDIVIDUAL ROUTE MAPS

Route 1: Capital

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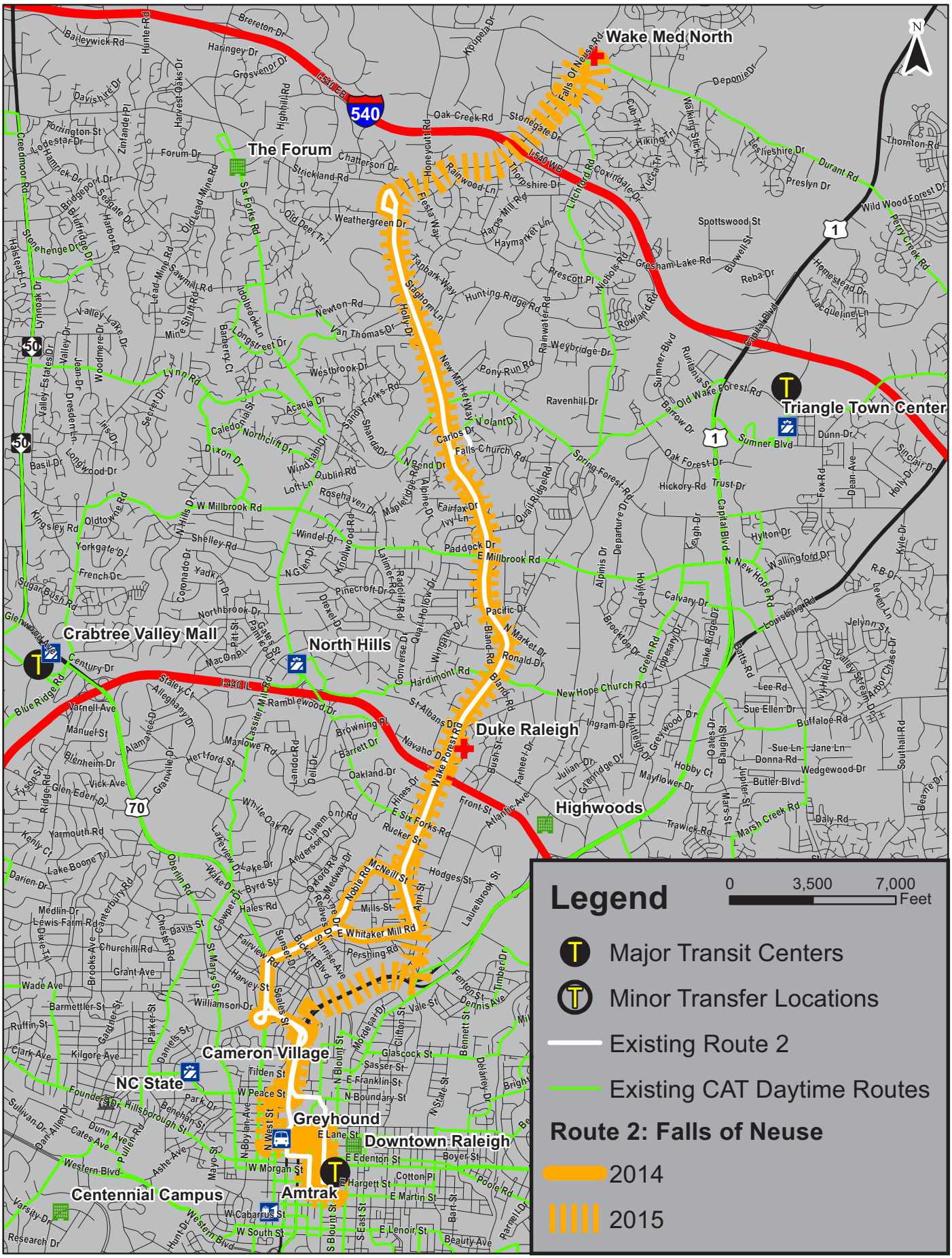
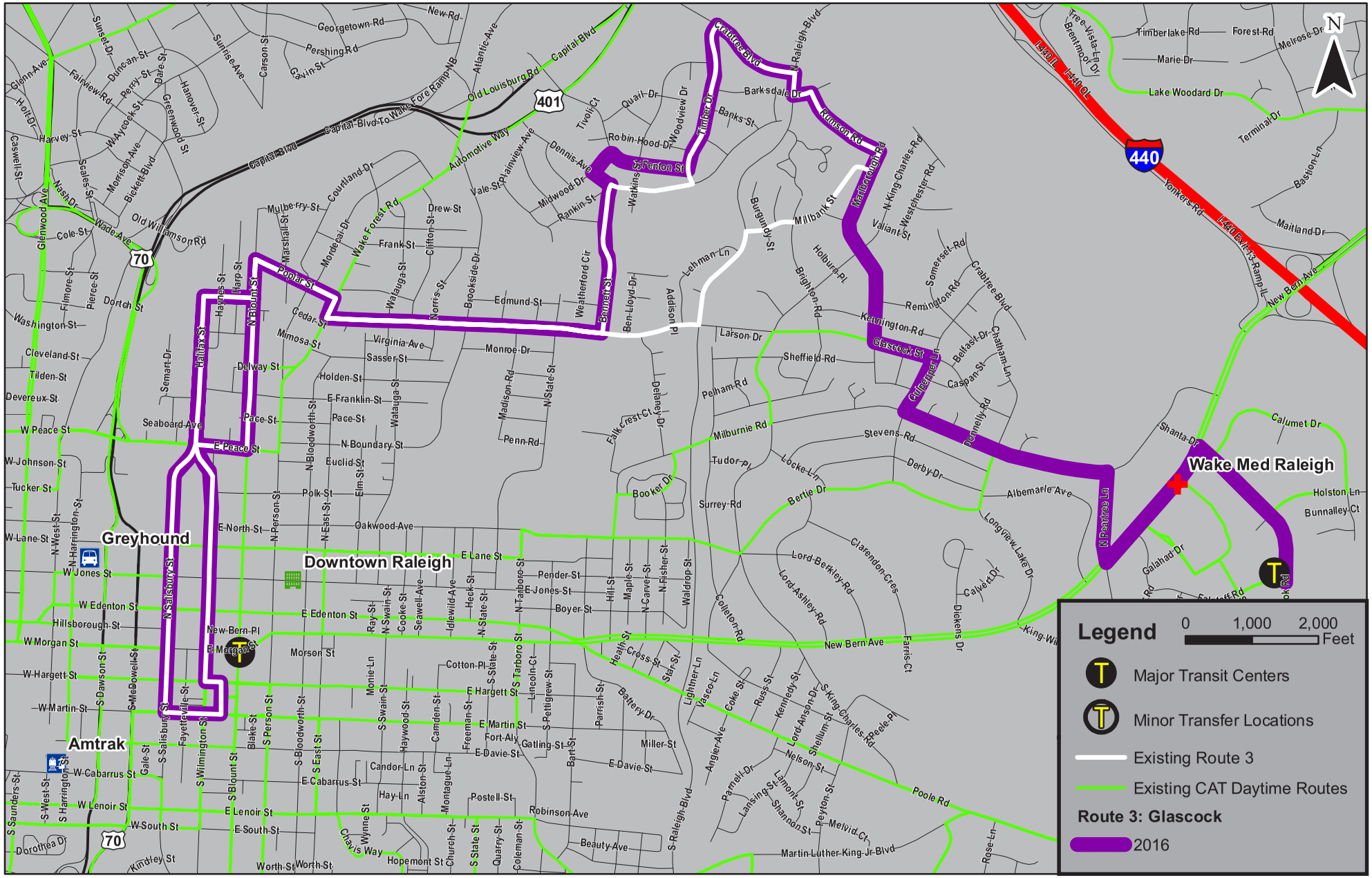
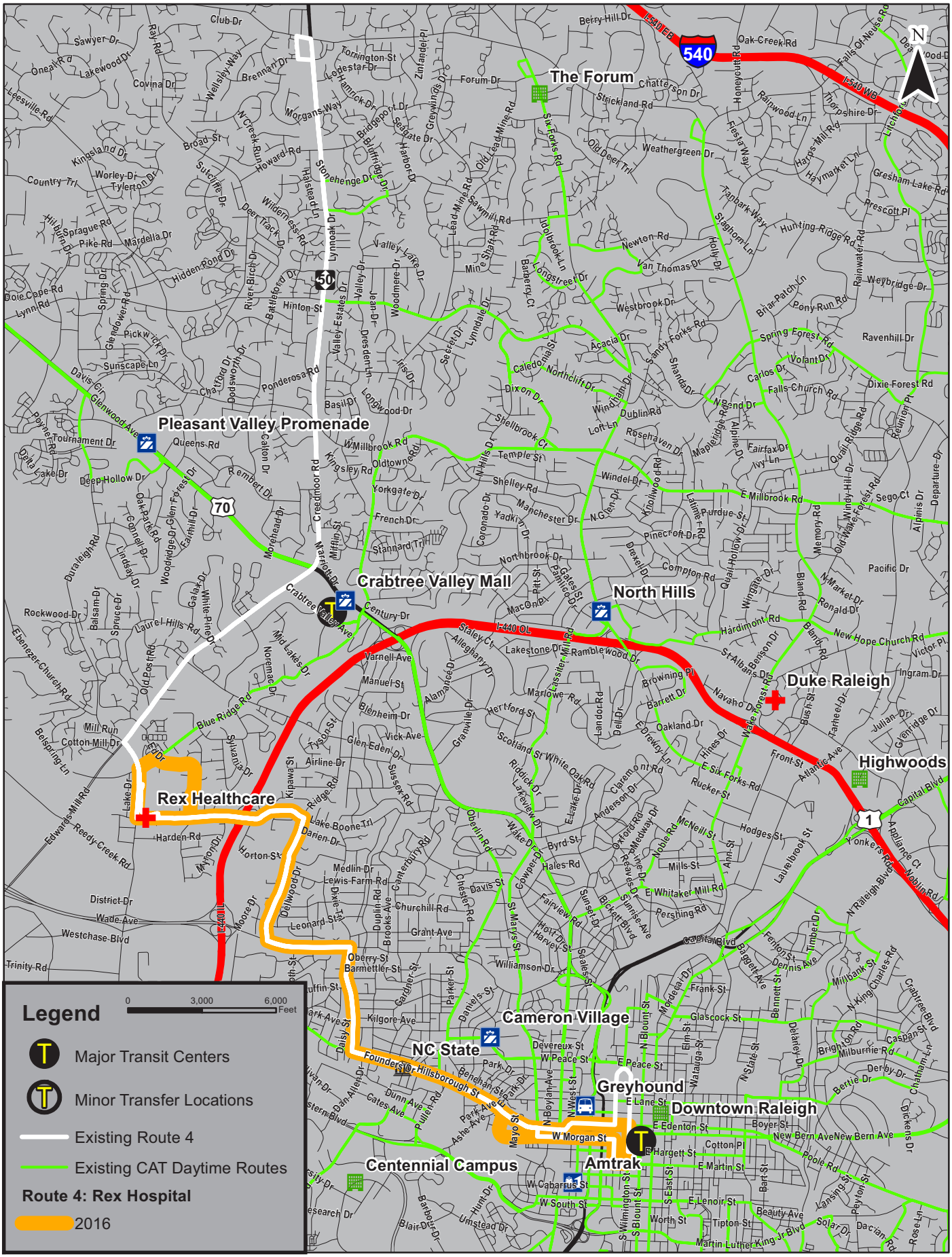


Route 2: Falls of Neuse



Route 3: Glascock



Route 4: Rex Hospital

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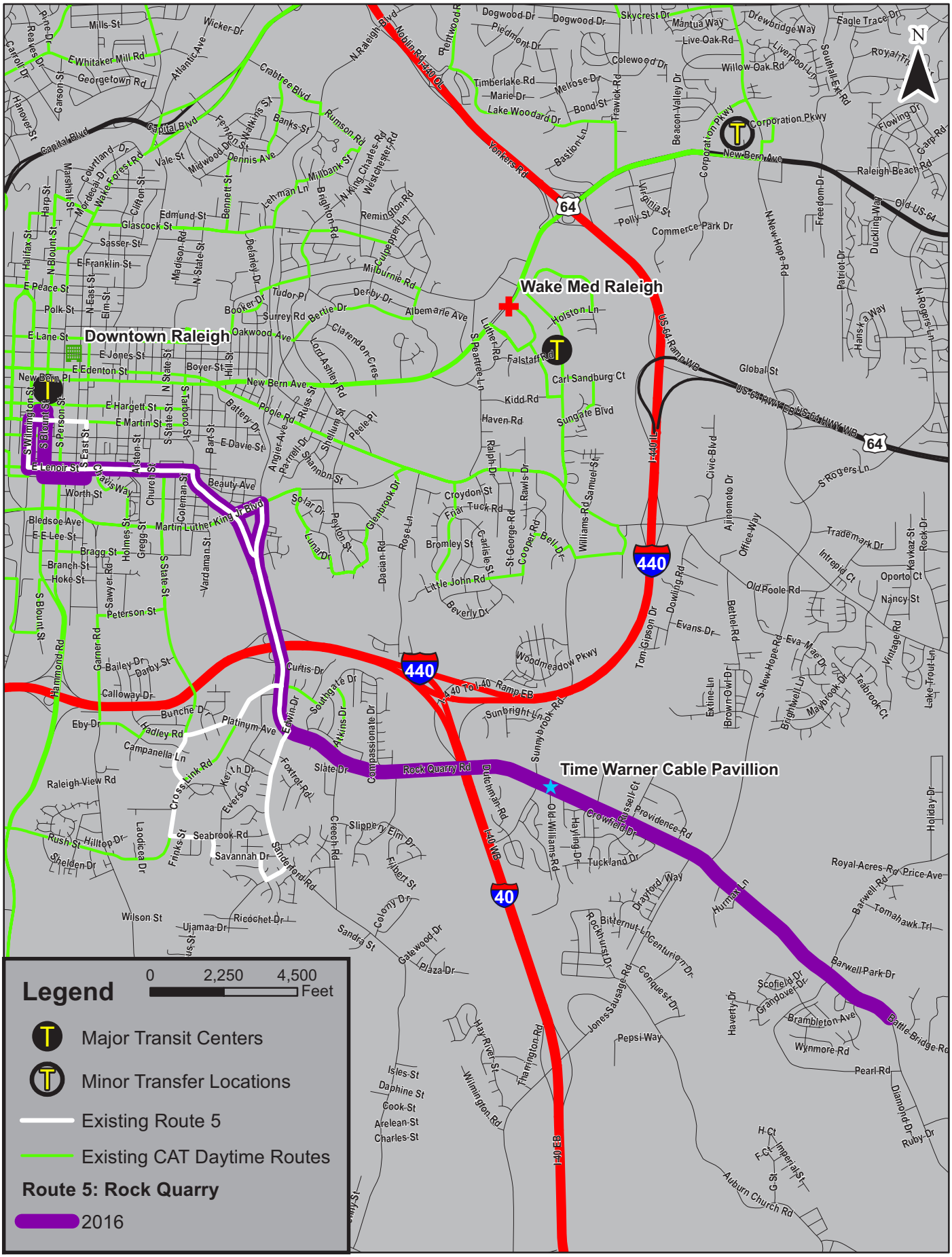

Route 5: Rock Quarry

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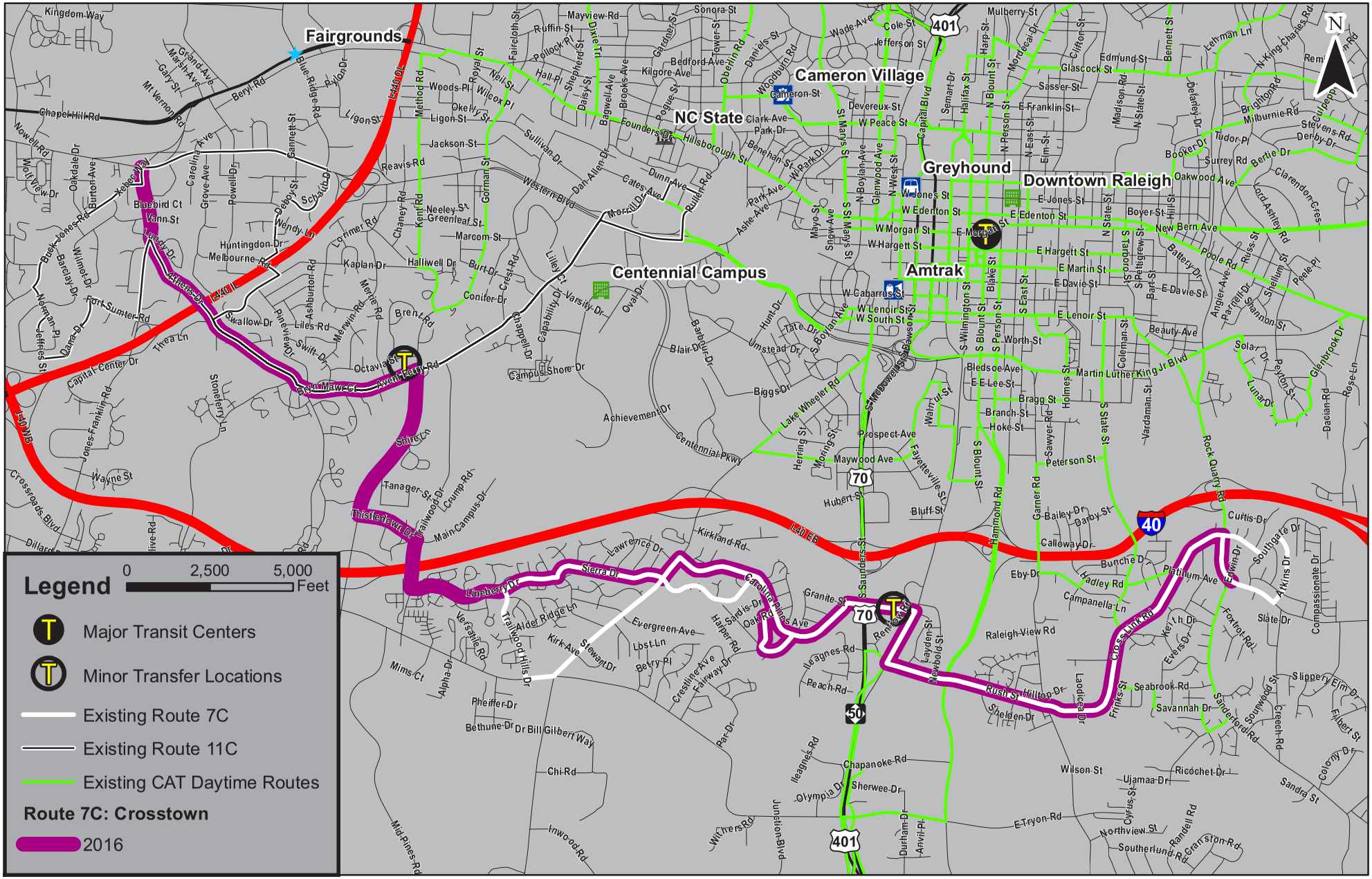
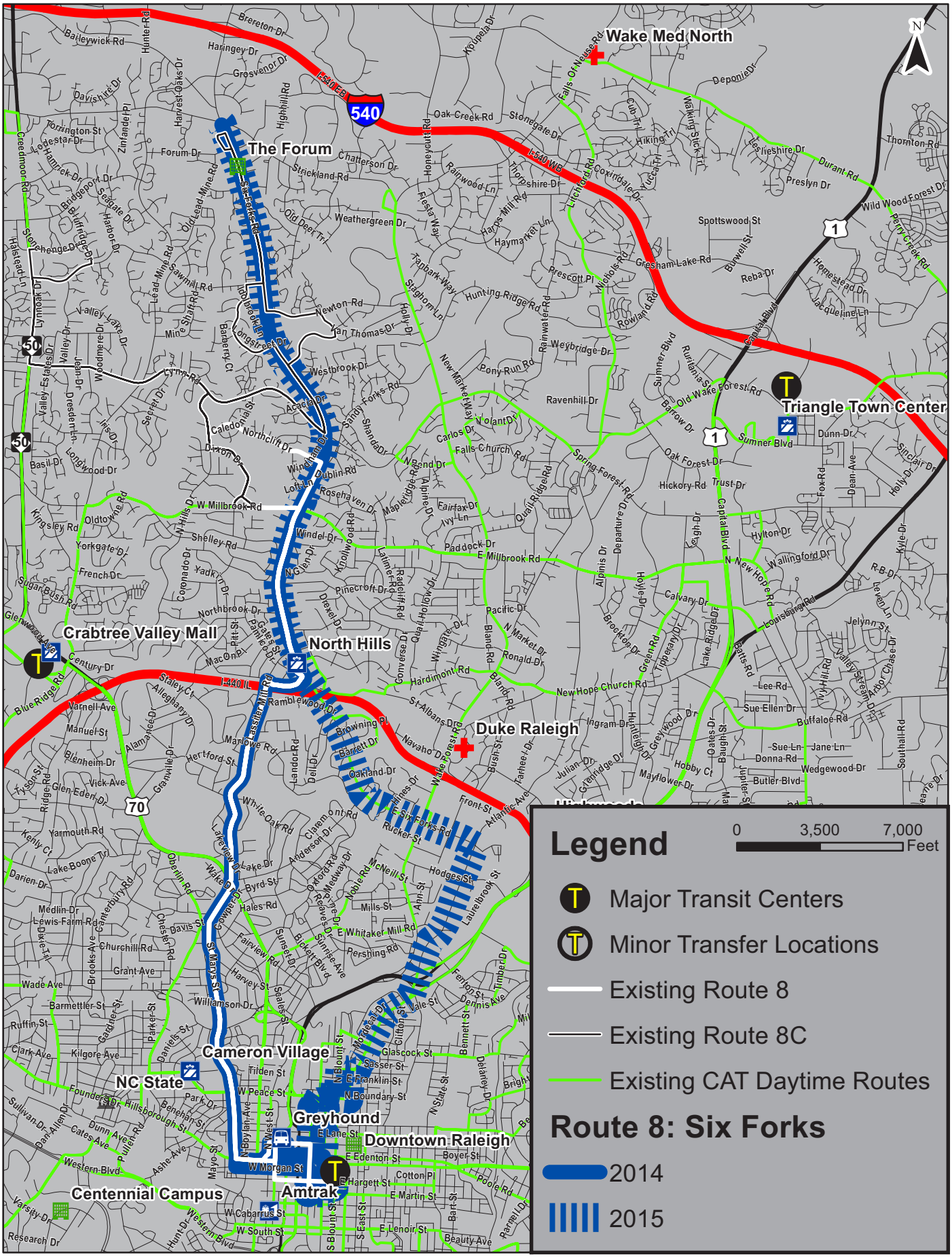
Route 6: Crabtree

Route 7: S. Saunders



Route 7C: Crosstown



Route 8: Six Forks

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